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Science on television : A representational site for mediating ideology

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MASTER OF ARTS (MEDIA STUDIES)

THESIS

Science on television: A representational site for mediating ideology.

Submitted in partial fulfilment of the degree of Master of Arts in Media Studies.

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ABSTRACT.

The emergence of a new science paradigm has been identified. It is characteristically described as structuring an organic, holistic and ecological framework for understanding the nature of reality. The modern scientific paradigm with its characteristic underlying inorganic, reductive, and mechanistic vision of reality, discursively dominates Western societies' cultural sense-making with its attempts to unlock the 'mysteries' of nature. The radically different characteristics of the new paradigm science is linked to 'rising culture' articulated in the exploratory social change of alternative social movements. The holistic principles and ecological values found variously in the environment, feminist, and new age/holistic health, peace and indigenous people's movements link to the new paradigm. Both factual and fictional television texts engaging discursively with science, present a representational site for different cultural expression of the preferred meanings of ideology of two radically different paradigmatic frameworks.

DECLARATION

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any institution of higher education; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Signature...

Date.....27th December '95.....

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Chapter 1.

1. Introduction

1.1. Rising Culture and the Shifting Paradigms of Science.

This thesis focuses on science on television. Science on television presents a site in which to engage with the cultural manifestations of the ideology of scientific paradigms in their quest for a representational voice. The concept of competing paradigms and paradigm shifts provides a useful framework to discuss key social shifts in values, principles and practices that link to the paradigms of science and non-science knowledge discourses. Identifying the different paradigmatic ideologies enables this thesis to discuss them in relationship to different the rhetorical modes of television. Analysis of television science texts reveals the ideology of the modern paradigm and the new paradigm and the links between these meanings and representational strategies.

The core structure of the modern paradigm is sourced from various historical discursive attempts to unlock the 'mysteries' of nature. Derived from the theory of philosophy and science, the modern paradigm constitutes the framework underpinning the ideology of comprehensive historical term 'modernism'. This thesis employs the concept of 'the new paradigm' as a meta-rhetorical framing device to identify the core structure that underscores various revolutionary post-modern paradigm shifts in both science and non-science knowledge discourses.

The new paradigm has been variously identified in science (Capra & Steindl-Rast, 1992), economics (Henderson, 1991), politics (McLaughlin & Davidson, 1994), and cultural studies (Jones, 1993). The emergence of this new paradigm represents a radical challenge to the hegemonic thinking of the Western world. Until recently the modern paradigm dominated European scientific and cultural sense-making to guid : its underlying vision of reality.

The framework to the modern paradigm can be traced back to various philosophical and scientific achievements of the seventeenth century Scientific Revolution, and the eighteenth century Enlightenment. According to Habermas (cited in Harvey, 1989, p. 13) this led to incredibly optimistic visions which created "the extravagant expectation that the arts and sciences would promote not only the control of natural forces, but also understanding of the world, of the self, moral progress, the justice of institutions and even the happiness of human beings." Habermas (1983) called this collective cultural movement the "project" of modernity.

Embracing the visions of modern science. the project of modernity constructed the Western world's dominant rationale and beliefs on the basis of a mechanistic world view. Noted physicist and systems theorist, Fritjof Capra (1993) summarises the nature of modern paradigm framing on dominant meanings as:

> The view of the universe as a mechanical system composed of elementary building blocks (the influence of Cartesian philosophy and Newtonian physics); correspondingly, the view of the human body as a machine, which is the conceptual basis of the theory and practice of our medical science; the view of life in society as a competitive struggle for existence (inherited from the Social Darwinists); and the belief in unlimited progress to be achieved through economic and technological growth. (p. 23)

Capra's summary indicates the range and pervasiveness of the modern paradigm's ideological influence beyond science, to dominate meanings and critically impact on both wider cultural and social discourse.

The core structure of the new paradigm draws from revolutionary theoretical shifts within and beyond science, which is supported by critical cultural responses to the limitations of the modern paradigm. The global tragedy of the Second World War exploded belief in the optimistic and liberating purpose of the modern industrial project. Cultural writer, Jeffery Nuttall (1968) coined the phrase "bomb culture" to label rising anti-modernist societal response to the Second World War, and to signal a new critical cultural environment framed by the perceptions of living with the dark side of modernism.

On the positive side, the culminative and celebratory science and technological event of 1969 that resulted in the first pictures of the earth from the moon, has been identified by writers such as Houston (1993), Campbell (1988), and Roszak (1993), as the key moment in initiating new "global" perceptions of mythological proportion: "a new synthesis of science and spirit; a shift from a geocentric to heliocentric world view" (Campbell, 1988, p. xviii). While simultaneously celebrating the achievements of modern science, the new global visions triggered by this event provided an important icon for rising critical culture. In cultural terms, the vision of the earth from space acted as a catalyst for a shift in point of view for the development of new theory.

This shift in point of view connects with what Roszak (1970) called "counter culture" to describe the alternative and critical social response of the late 1960's social movements attempting to address the desire for individual, and societal change. Later, in the context of linking this social change to the emergence of the new paradigm guiding new physics theory, Capra (1982) called this shift as "rising culture". He argues that rising culture is less about an antithesis to modernism, and more about theorising alternative sustainable values.

The discursive shift of "bomb culture", moving to "counter culture", and finally to "rising culture", rhetorically tracks cultural expression of the shift from the dominance of the modern paradigm to the emergence of postmodern, new paradigm informed scientific and social theory. In the area of culture, Harvey (1989) links both the anti-modern and counter culture and pin-points 1968-1972 as the time in which the alternative and resistive postmodern movement emerged from the post-war cultural chrysalis.

Concurrent with exploratory social change, revolutionary scientific theoretical developments are constructing alternative scientific rationales for describing a radically different sense of reality. Included in these developments are theories from quantum physics, chaos mathematics, systems analysis and complexity theory. On the margins of science and beyond, new theories from ecology such as Gaian theory, and from biology examples such as revised evolutionary theory, also contribute to the shifting understanding of the nature of reality.

The anomalous modern visions of nature of reality foregrounded by post-modernist science reverberate beyond the boundaries of science. Radical economists (Henderson, 1992; Hamilton, 1994) critique economics for its uncritical adoption of the modernist world view to frame its claimed 'rational' theory and quantifications. Feminist theory has drawn attention to the way dualistic gender metaphors reveal the underlying meanings in supposed value neutral scientific thought. Feminist writers (Steinem, 1992; Wajcman, 1991) highlight the link between the values of the modern paradigm and those of the dominant European patriarchal values.

These revolutionary scientific and non-scientific theories, and various social and cultural movements, foreground an alternative common core structure that indicates the appropriateness of the concept of the new paradigm. Capra (1993) describes this core structure as framing a complex "organic", "holistic", or "ecological" world view, which sees the world as an integrated whole, rather than the modern view of a disassociated collection of parts.

This thesis draws heavily on the works of Capra, in conjunction with extended concepts drawn from futurist and holistic economist, Hazel Henderson (1991), and radical ecologist and feminist, Carolyn Merchant (1992), to identify the key scientific characteristics, holistic principles and ecological values that frame the new paradigm preferred meanings. These scientific characteristics, holistic principles and ecological values present an alternative discursive framework to identify the representation of the new paradigm ideology. The core structure of the two paradigms provides a comparative model to identify representations of the ideology of the two positions.

1. 2 Paradigms: Frameworks for Scientific Theory.

Science philosopher, T. S. Kuhn (1970) in his classic work The structure of scientific revolutions, employed the term "paradigm" to refer to the common pattern which underpins scientific theory and discourse. Kuhn drew attention to the nature of that common pattern as not being one of method, but rather a common pattern of social and institutionalised behaviour amongst scientists. According to Kuhn, while there are numerous science disciplines and sub-disciplines employing different sub-cultures of research, they all exhibit commonality of shared social and institutionalised behaviour between scientists.

From a post-Kuhnian perspective a paradigm is a theoretical framework within which all scientific thinking and practices operate: "a scientific paradigm is a constellation of achievements - concepts, values, techniques, and so on - shared by a scientific community and used by that community to define legitimate problems and solutions" (Capra & Steindl-Rast, 1992, p. 34). This theory articulates the way particular patterns come to dominate thinking, and also the way similar patterns develop across different science disciplines and sub-disciplines.

Khun (1970) called those time periods when there is great agreement between scientists a"normal period". In contrast to these 'steady state' paradigmatic times, there are periods of "scientific revolution" during which the paradigm shifts. During a revolutionary period there is much debate and questioning amongst scientists in which the theory, tools, techniques and standards change, heralding in an embryonic new paradigm. Again with the agreement of the scientific community another normal period may follow.

The classical model of a paradigm shift articulates the process which enables a new paradigm to operate and become accepted. The concept of paradigm shift highlights the importance in the development of a scientific paradigm of the interconnected reinforcing cultural environment in which the new and alternative theory both functions and is affirmed.

Kuhn (1970) points out that one of the things a scientific community acquires with a paradigm is a set of criterion for choosing problems, that, while the paradigm is taken for granted, are assumed to have solutions. This criterion set frames scientific questions, which are deemed significant through a process built on the certain concepts, values and techniques that are shared by the scientific community.

Accepting the criterion set involves rejecting other problems that do not fit the set as metaphysical, as the concern of another discipline, or as just too problematic to be worthwhile pursuing. According to Kuhn (cited in Henderson, 1991) once a paradigm is an accepted model or pattern, it is rarely an object for further articulation or specification under new or more stringent conditions. It is only when a new paradigm emerges that the limitations of the old are revealed.

For Kuhn (1970) a scientific paradigm gains its status because it is more successful than its competitors in solving the problems that a group of practitioners have come to recognise as acute. In Western society, the status attributed to a science paradigm frames knowledge discourses hierarchically, with the science discourse dominating the accepted vision of the nature of reality. The discursive influence of the core structure of the modern paradigm to frame the scientific vision of the nature of reality is conventionally validated by dominant cultural rhetorical practices. These practices validate theoretical laws presented and claimed as 'truth'. In line with this logic, the methods for affirming the 'truth-framing-laws' are described as being 'value-free', or 'objective'.

The acceptance of and power attributed to these affirming practices justifies the dominant hierarchical positioning of science over non-science discourses. The effects of this dominant positioning extends to further empower the rationale of science onto the theory of the supportive social and cultural environment. The influence of the paradigms of science reverberate the meanings of the scientific vision of reality, and its affirming methodology far beyond the domains of science.

With such dominant power attributed to the paradigm of modern science and its supportive cultural environment in the last three hundred years, how do paradigm shifts occur? Kuhn (cited in Brockman & Rosenfeld, 1975) describes this process as in the following way:

> Discovery commences with the awareness of anomaly, i.e., with the recognition that nature has somehow violated the paradigm-induced expectations that govern normal science. It then continues with a more or less extended exploration of the area of anomaly. And it closes only when the paradigm theory has been adjusted so that the anomalous has become the expected. Assimilating a new sort of fact demands a more than additive adjustment of theory, and until that adjustment is completed, until the scientist has learned to see nature in a different way, the new fact is not quite a scientific fact at all. (p. 205)

It is apparent that, prior to theoretical acceptance of a new paradigm, scientists or a science community must make a significant number of intellectual leaps of faith. In the latter part of this century revolutionary leaps of faith concerning the nature of reality have emerged to become theoretically accepted. Their frameworks converge to build the radically different new paradigm to science. According to Capra "it is only in times when the paradigm changes that you see its limitations, and, in fact, it changes *because* of these limitations" (Capra & Steindl-Rast, 1992, p. 35).

New theory within science contribute to collective scientific community adjustment of the visions of reality as they link to construct a revolutionary paradigm shift. Radical theoretical shifts calling for a substantial paradigm shift call for 'revolutionary' rhetoric to gain institutional support for the new paradigm, and thus attempts to discredit the old perspective.

For economist and futurist, Hazel Henderson (1991), a new paradigm is a pair of different spectacles which reveals a new view of reality, allowing us to re-conceive our situation, re-frame old problems, and find new pathways for evolutionary change. In Paradigms in progress, she speaks of Kuhn's caution at her desire to expand his understandings of the process beyond science to the social context. Acknowledging Kuhn's caution, it is useful to make the distinction between the different models of a science paradigm and a social paradigm. While these models operate differently, the structural links between a science paradigm and a social paradigm through their shared common pattern, or core structure, articulate the ways a scientific paradigm reverberates culturally.

Building on the idea of concepts, values and techniques that structure a paradigm, Capra extrapolates beyond Kuhn's science based definition to identify a social paradigm:

> A social paradigm, for me is a constellation of concepts, values, perceptions, and practices, shared by a community that forms a particular vision of reality that is the basis of the way the community organises itself. It's necessary for a paradigm to be shared by a community. (Capra & Steindl-Rast, 1992, p. 34)

Capra argues that while different social paradigms can co-exist, scientific paradigms cannot. A scientific community shares a scientific paradigm to frame its theory as it contributes to the dominant scientific vision of reality. This implied the sciences as closed discourse while in steady state periods. Different social paradigms can exist heterogeneously. However the values, perceptions and practices implicit in a the dominant position attributed to scientific paradigm link to the reinforcing nature of those underpinning a dominant social paradigm. Reflecting the diversity of co-existing social paradigms Jones (1993) highlights the ways that cultural aspects of pre-modern, modern and new paradigm world views are identifiable and seen to exist simultaneously in present day thinking.

The diversity of co-existing social paradigms reflects the presence of diverse cultural and social visions of reality. However with the power vested in the paradigms of science in Western society, a revolutionary scientific paradigm shift is pivotal in informing revised and revolutionary social and cultural visions for understanding the nature of the world around us. New paradigm informed writers such as Capra & Steindl-Rast (1992), Ross (1993), Steinem (1994), and McLaughlin & Davidson (1994), critically engage with the values underpinning the dominant Western patriarchal social paradigm with its strong links to the modern paradigm of science.

The concept of a paradigm shift provides a model for this thesis to identify the ideology underpinned by the various characteristics, principles, and values that underscore the radical difference between the core structure of the modern paradigm and the new paradigm as they are represented in television science texts.

1.3 Hegemony: Models for Cultural Maintenance and Change.

The preceding discussion identifies the key role attributed to the reinforcing institutional and cultural environment that enables a paradigm to thrive and gain power. This paradigm model drawn from the philosophy of science links with the social and cultural theory of hegemony. The concept of hegemony, developed by Gramsci in the 1930's, is used to describe the social phenomena of the maintenance of power of certain classes to dominate others. In understanding hegemony it is critical to see it as a process for gaining and maintaining power in society. For Lull ('995) the concept of hegemony provides one way to "interpret the complex dialectic between institutionally sponsored, technologically mediated ideas and culturally situated, intentional social action" (p. 31).

Fundamental to hegemony is the processes where by consent is actively sought from the subordinate by the powerful in order to maintain their dominant position. It is central to emphasise hegemony as 'process' oriented, as a negotiated eclectic dialogue between "structures of domination, subordination, and resistance". (Fiske, 1987, p. 41). Fiske, cites the work of Said (1984), to further emphasise that the strength of the complexity and diversity of the culture that is the outcome of this hegemonic process in Western society, is the resultant "heterogeneous plurality". The struggle for hegemonic power in institutional and social structures in contemporary society is articulated through diverse cultural products. Media texts present a site to mediate the struggle to negotiate the preferred meanings that articulate hegemonic power.

The role of the mass media is critical to this process. Lull (1995), citing Bausinger, (1984) says of the mass media that:

> Because information and entertainment technology is so thoroughly integrated into the everyday realities of modern societies, mass media's social influence is not always recognised, discussed, or criticised, particularly in societies where the overall standard of living is relatively high. Hegemony, therefore can easily go undetected (p. 34).

The subtle and naturalised articulation of the hegemony of the powerful in society is best understood as a process of coercion rather than suppression and force. Expanding further Lull (1995, p. 34) says that the "relationships between and among the major information-diffusing, socializing agencies of a society and the interacting, cumulative, socially accepted ideological orientations they create and sustain, is the essence of hegemony." It is through this process of hegemony that science programs on television mediate to communicate the preferred meanings of the dominant ideology of institutionalised science discourse.

But is it the hegemonic ideology of the modern paradigm that dominates the meanings contained in contemporary television science texts, or the preferred meanings of the new paradigm? Do these texts display representations of the 'revolutionary rhetoric' that it is argued is essential to shift the power from the modern paradigm, to the emergence of a new paradigm and thus enable science to maintain its hegemonic power? Said (1984) explains that the real depth in the strength of the modern Western state is the strength and depth of its culture, and culture's strength is its variety, its heterogeneous plurality. Arguably in a society that claims to place a high value on democratic participation, the substantial representations of both paradigm the points of view and preferred meanings is essential for democratically negotiating hegemony.

By analysing selected television texts this thesis will track the paradigm representation. The ideology of the core structures of the two paradigms can be found, for example, in various representational strategies used by television producers to address their various "imagined" audiences. Different producers' intentions, modes of production, modes of address and

representational strategies chosen to interpellate specific audiences, articulate variously the ideology of the two paradigmatic positions.

1.4 The Key Scientific Characteristics of The Two Paradigms.

The first scientific framework of this thesis focuses on identifying the scientific characteristics underpinning the two paradigms. The key binary characteristics proposed by Capra (Capra & Steindl-Rast, 1992, pp. xi-xiv) provides a useful analytical criterion to position the shift between the two. He describes these characteristics as moving from part to whole; from structure to process; from objective science to "epistemic" science; from building to network as metaphor of knowledge; and from truth to approximate descriptions.

1.5 The Holistic Principles Of The New Paradigm.

The second framework is called the holistic framework. Paralleling Capra's scientific framework in the social and economic area, Henderson (1991, p. 18) summarises the key principles she identifies as underpinning the new paradigm of a "post-Cartesian" scientific world view. These principles involve the concepts of interconnectedness; redistribution; heterarchy; complimentarity, uncertainty; and change. They are based on an organic, global view, and biological and systemic life sciences, rather than modern paradigm informed inorganic, static equilibrium, and mechanistic models. Henderson's six principles structure a second holistic framework to accompany Capra's scientific framework, for this thesis to discuss the new paradigm.

1. 6 The Ecological Values Of The New Paradigm.

In addition to Capra's scientific framework, and Henderson's holistic framework, this thesis uses a third framework to map those ecological values that contribute to a new paradigm world view. Underpinning both the modern and the new paradigm are the guiding principles of our relationship with nature and the wider cosmology. The typical vocabulary for describing the modern paradigm relationship with nature is 'dominance' and 'mastery'. Discursively the modern paradigm of science positions humanity outside of nature; the new paradigm re-positions humankind within nature.

This third framework is termed ecological. In radical ecologist, Carolyn Merchant's (1992) work she proposes three stages of environmental ethics, which identify the various positions that articulate the basis in which various groups in society have struggled over land and resources. These relationships she outlines in the following way: "an egocentric ethic (grounded in self); a homocentric ethic (grounded in the social good); and an ecocentric ethic (grounded in the cosmos, or whole ecosystem)" (p. 82).

This ecological framework contribute to the third part of this thesis' analytical model to position discourse in television science texts in relation to those values underpinning representations of our interactions with the non-human environment. The three ethical categories articulate the shift from the modern to the new paradigm with regard to our relationship with the environment. Those representing "ecocentric" values culturally resonate with new paradigm ecological understanding. It is expected that modern paradigm values will dominate.

In summary, these three frameworks: Capra's scientific framework drawn from science, Henderson's holistic framework from economics, and Merchant's ecological framework from ecology, enable the identification of the representations the characteristics, principles, and values underpinning either the modern paradigm, or the radically different emergent new paradigm in television science texts. Does the science culture portrayed on television reflect the adaptive process-oriented capacity of hegemony to incorporate change in order to maintain that dominant positioning for science in society? The following chapter explores the nature of the preferred meanings that inform the core structure of the two paradigm frameworks.

Chapter 2.

2. Background

Key contributory theoretical perspectives drawn from both science and non-science disciplines inform the different frameworks of the core structure of the two different paradigms. Discussing the key components to the two scientific paradigm frameworks identifies their radically different implicit ideologies that shape theory, values and practice beyond the domain of science.

2.1 The Modern Paradigm: Scientific Frameworks Structured on Reductive, Mechanistic, and Inorganic Models.

There are dangers in attributing key temporal formations to a handful of individuals without reference to significant contextual factors. Nevertheless it is a useful way to link the modern paradigm of science and the ways this informs the anthropocentric, Eurocentric and patriarchal logic of the modern world view. This has been identified in various philosophical and scientific theories drawn from the work of a handful of European Scientific Revolution and Enlightenment men: Copernicus, Kepler, Galileo, Newton, Bacon, and Decartes. The way history records their often isolated and individualistic efforts reflects mythologises scientific explanations, rationale and methodology. Their work frames the progressive, mechanistic, linear and deterministically orientated pathway of Western Science.

The pre-modern world view positioned humans in harmony with nature and the wider cosmology. The then revolutionary modern world view positioned humankind outside of nature, relegating questions of God and cosmology as peripheral. Such peripheral questions became the concern of theology and philosophy. Noted physicist Paul Davies (1992) sees that the emphasis in the modern world view, as constructed in the work of these European men, was to regard man and nature as distinct. Experiment was seen as a sort of dialogue with nature, whereby "her secrets could be unlocked. Nature's rational order, which itself derived from God, was manifest in definite laws"(p. 37).

Theory, framed by the characteristic reductive, mechanistic, theoretical and experimental approaches, provided the scientific means and methodology to unravel nature's mysteries. Behind this mechanistic 'unlocking nature's secrets' through rational theory, lay in the desire to develop powerful 'laws'. These were established by scientific methodology built on the affirming concepts of experimentation, observation, objectivity. It was believed this approach led to certitude, and "truth".

Subsequent to the core principles of a mechanistic, reductive and linear vision of reality, Darwin's evolutionary theory further impacted on rationale. Evolutionary theory changed the explanation of nature from beneficent design, to chance and struggle. Appleyard (1992), citing Sheldrake, explains the way this theory guided thinking: "we think of one thing happening and then another, and all of this being guided by laws which somehow persist eternally within nature. The past simply provides a causal platform for the present; it has no organic involvement" (p. 188). Central to Darwin's theory of evolution was the idea of dispassionate or 'objective' observation of the nature of things. In adopting Darwin's theory the extrapolation was made by followers of Darwin that "observation reveals truth; and once revealed, truth can be generalised" (Hardison, jr. 1989, p. 31).

Davies (1992) discusses the dramatic impact of this new theory in the following way:

> Four hundred years ago science came into conflict with religion because it threatened man's cosy place within a purpose-built cosmos designed by God. The revolution begun by Copernicus and finished by Darwin has the effect of marginalizing, even trivialising human beings. People were no longer cast at the centre of a great scheme, but were relegated to an incidental and seemingly pointless role in an indifferent cosmic drama, like unscripted extras that have accidently stumbled into a vast movie set. (p. 20)

According to Davies this developed an existentialist ethos, placing no significance in human life beyond what humans invest in it. The effect is to further alienate humans from the universe in which they live.

The impact of Darwin's theory was dramatic and it was applied discursively beyond science to sociology, politics, and history. The writing of history became an evolutionary discourse, with the way it was recorded being constructed to fit into an evolutionary model. This served to critically build 'progress' into a temporal model. The widespread consequence of this according to culture critic, O.B. Hardison, jr. (1989) was:

> The histories of political systems, national economies, technologies, machineries, literary genres, philosophical systems, and even styles of dress were presented as examples of evolution, usually interpreted to mean examples of progress, from simple to complex, with simple considered good, and complex better. (p. 32)

The application of this theory beyond the knowledge discourses of science, highlights its dominant hierarchical position. This quotation illustrates the ways the concept of evolutionary progress from science interlinks to structure the concept of evolutionary progress into the models social theory. The core meanings underpinning this discursive position in turn informs the dominant ideology of supportive modernist culture.

Evolutionary theory provided the dominant theoretical model within and beyond science, forming the rationale for a scientific, social and cultural model of progress. The concept of progress

became the central ideological motivation of modern science, with technology conceived as the enabler of that vision of history. In a discursive manner, this evolutionary model extended from the concept of 'progress' to 'growth'.

Shifting these values beyond the domain of science to Western capitalism, the idea of growth and progress was on one hand fundamentally conceived around the concept of human's mastery of nature; progress was for humanity's, though more often, European benefit. On the other hand the concepts of progress and growth provided the fundamental model for capitalistic economics. For Gillian Ross (1993) the philosophy of Social Darwinism - the survival of the fittest applied to human endeavour - is the prime mover of the capitalistic ethic.

The discursive outcome of this modern paradigm framework when extended to the wider supportive cultural environment, was 'civilised' European man being positioned at the top of a hierarchical vision of peoples and cultures. The evolutionary, mechanistic and reductive theoretical construction of reality of modern science and technology justified this view. The rhetorical and discursive articulation of the core paradigmatic framework extends the preferred meanings from science to other knowledge discourses such as history, politics and economics.

The ideology and values of the core structure to the modern paradigm of science informs the meanings expressed in the visions and beliefs structuring powerful social paradigms. These social paradigms reinforce paradigmatic assumptions and enables the meanings of the paradigm to culturally thrive. The complex and comprehensive nature of the pervasiveness of the modern scientific model echoes powerfully through the culture constructed in twentieth century discourses, as they frame its dominant value of "atheistic materialism" (Ross, 1993).

For Hardison jr. (1989) the interconnected cultural effectivity of the vision of science's paradigms, is best described in metaphorical terms: "Nature, history, language, and art are all part of a wonderfully intricate mobile; touch one and the rest tremble and change position in sympathy" (pp. xiv). The metaphor describes the link between the modern paradigm of science and dominant cultural discursive practices. Appleyard (1992) notes the importance of recognising that modern science, in building its powerful model, has conditioned our language to conform with our understanding of the world. Critical examination of the rhetorical framing of various discourses reveals the impact of science beyond its knowledge discourses.

The history of achievements of the European 'founding fathers' of the modern scientific paradigm contributes to a mythic patriarchal story. Patriarchal Eurocentric history mythically records the individualistic dedication of those credited with contributing to this Scientific Revolution. The powerful revolutionary rhetorical narrative employed in the writing of that history laid down the key components for values, principles and practices of the Western world.

The grand project focused on reductively unravelling nature's secrets and applying the utilitarian value of this knowledge to progressively improve man's lot.

In stark contrast to this progressive discourse, evolutionary theory left man as merely a biological response to the forces of evolution shaped by nature. This linear, reductive, mechanistic and inorganic world view, left 'civilised' Western man motivated to reaffirm his hierarchical positioning through a project based essentially around mastering and dominating nature. The outcome of this structures a discursive relationship between man and nature best served by the rhetoric of 'domination' and 'mastery'. The project enabled a sense of control in the universe, with science forged as man's tool to play god with nature.

With questions concerning cosmology and God relocated beyond science to religion, the modern project is arguably underscored by a collective attempt to redress and compensate materialistically for this detached and impoverished spiritual outcome created for Western man. The culture of atheistic materialism with its 'liberating' and 'progressive' promises is envisaged as adequate reward. With reality framed linearly as progress, the quality of life is necessarily constructed as always improving.

That sense of mastery, certitude, truth, and progress was derived from theory structured on reductive and fragmented models. Explaining the success of the modern paradigm model Appleyard (1992, p. 150) says: "classical science works because it simplifies. It takes on only those problems that can be solved by the known method. The entire scientific edifice, for all its hermetic inaccessibility to the uninitiated, is a vast monument to simplification". The reductive, mechanistic, and inorganic models verified and reinforced. the predictions and the power of the modern paradigm.

However radical new theories critique the ways these liberating models, progressive promises, and visions were built on the illusionary certitude of simplified and reductive framed models. In the second half of the twentieth century serious problems arose from applications of that simplified view of reality highlighting anomalies and revealing the modern paradigm framework's limitations and failings. The concepts of objectivity and truth, central to modern paradigm science's affirming methodology were also found to be problematic and anomalies emerged.

2.2 The New Paradigm: Scientific Frameworks Structured on Complex, Interconnected and Organic Models.

The last thirty years has seen new scientific theoretical perspectives emerge drawing attention to theoretical anomalies. These anomalies reveal the limitations of theory framed on inorganic, simplified, reductive and mechanistic models. New theoretical concepts about the nature

of reality contribute to the development of a new scientific revolution. The development and acceptance of new theory in diverse disciplines and sub-disciplines of science necessitates the process of a new paradigm to reframe Western sense-making.

New 'revolutionary' scientific theories construct alternative rationales for describing a radically different sense of reality. In the words of Appleyard (1992, p. 141): "classical science told us that the truth could be ours; this new science tells us either that it might be beyond our grasp or, at the very least, that it is infinitely stranger than anything we could previously have imagined." Examples of new understandings from within science emerge from the fields of quantum physics, chaos mathematics and systems theory. They challenge both the old type of inorganic, reductive and mechanical model, and its core notions of scientific objectivity and truth.

Capra (Capra & Steindl-Rast, 1992) offers a binary criteria outlining the key components for tracing the paradigmatic shift. It is a a useful scientific framework to engage with the alternative meanings which underscore the contributory models informing the new paradigm. The framework traces the various components to the paradigm shift from the modern to the new: from part to whole; from structure to process; from objective science to "epistemic" science; from building to network as metaphor for knowledge; and from truth to approximate description. This binary framework guides discussion outlining the alternate problem solving theory of the new paradigm.

Shifts from part to whole

Quantum physics has identified various anomalies affirming the inadequacy of inorganic Cartesian/Newtonian reductive and mechanistic notions to reflect reality. These anomalies necessitated a shift to explain reality not as isolated fragments, but as more about organic relationships, interconnections and processes. With the new physics theory, the emphasis shifts from reductive components to acknowledging linkages and the articulation of the nature of these: "Ultimately there are no parts at all. What we call a part is merely a pattern in an inseparable web of relationships" (Capra & Steindal-Rast, 1992, p. 83). The nature of these linkages at the atomic level is reconceived of as organic.

Writing on the radical nature of this revolutionary shift, Appleyard (1992, p. 190) cites physicist David Bohm: "what we have discovered about the fundamental nature of matter is so radically opposed to our everyday forms of knowledge that nothing can remain unaffected". Similarly for biologist, Charles Birch (1993) the new theories critique the old theories for their limitations. He writes that "the old paradigm myth about matter is built on the fiction that the universe consists of nothing but a collection of inert particles, pulling and pushing each other like cogs in a deterministic machine" (p. 52). New paradigm organic models derived from physics, reveal the misconceptions of simplified, inorganic models in framing its notion of reality. The shift

to organic models for the framework for understanding the nature of matter shifts to theorise on the ways the parts construct the whole.

Shifts from structure to process.

With the shift in emphasis to the organic nature of matter, the new theory in physics shifts to describing the holistic nature of these interconnecting processes. These processes are described as being dynamic rather than mechanistic structures. The nature of these processes is complex. Appleyard (1992, p. 52) describes the principle of non-locality as quantum theory's most bizarre twist: "Particles can apparently have effects on other particles at a distance and apparently by communicating with each other instantaneously - in other words, at greater than the speed of light".

In comprehending the organic processes oriented framework for reality, new theoreticians turn to the question of 'consciousness'. At the frontier of new physics questions concerning the nature of 'consciousness', and the consequential philosophical questions draw the concept of theism back into the scientific domain. Modern science defined concerns about God as metaphysical and relocated them to philosophical and religious enquiry. An inorganic, reductive and mechanistic framework to comprehend reality is unable to handle the theoretical implications. Some of the new science theorists allow God to be called back into the scientific domain. Several writers (Birch, 1990, 1993; Davies, 1992) engage with the various ways this opens up further criticisms of the limitations of the materialistic and inorganic modernist world view and call for a non-dualistic interpretation of theism.

Theorising the implications of this, physicist Darryl Reanney (1993), argues that we live in a particulate or material world, and yet what the new theory from quantum physics argues is that a particulate world is in a profound sense, a creation of consciousness. Scientists such as Birch, Davies and Reanney renew their relationship with theology to debate concerns that consciousness may be an essential aspect of the nature of the universe. New theory heralds shifts in rhetorical descriptions of the nature of the organic processes.

Shifts from objective science to epistemic science.

Fundamental to the methodology that verified the assumptions of the modern paradigm was the practice of objective observation. It was believed that objectivity on behalf of the human observer to construct understanding of reality was possible, and this belief validated knowledge. Heisenberg's "observer effect" from quantum theory shows that nature cannot be separated from the person observing it, that the observer and the observed are inseparably intertwined. New insights draw attention to the discursive way knowledge is reinforced by methodology and institutional practices to validate its rationale.

New theory in quantum physics alerts to the dynamic relationship between the observer and the observed, and thus the very concept of value-free, or value-neutral is seen to be problematic: "In the new paradigm it is believed epistemology, the understanding of the process of knowledge, has to be included explicitly in the description of natural phenomena" (Capra and Steindl-Rast, 1992, p. 123). This leads to the preference of an epistemic approach to science rather than science constructed as a value-free system.

Linking with the work of Kuhn, "Epistemics" was coined in 1969 to signify the scientific study of knowledge. An extended definition is given in The Fontana dictionary of modern thought (1990, p. 279) as "the construction of formal models of the processes - perceptual, intellectual, and linguistic - by which knowledge and understanding are achieved and communicated". This approach to science highlights the linkages between social and institutional behaviour, and cultural rhetorical practices that produces the similar pattern or core paradigm structure across the sciences. These insights promote the necessity to move from describing science as objective knowledge to epistemic science.

Shift from building to network as metaphor for knowledge.

Epistemic approaches highlight the ways framework models influence theory and practice. The discursive framing of knowledge is reflected in language. Capra (Capra & Steindl-Rast, 1992) points out that architectural metaphors are frequently used in science to talk about knowledge. With a paradigm shift there is a need for a new metaphor of knowledge. He proposes the metaphor of knowledge as 'network", rather than a 'building". This metaphor articulates a rhetorical model incorporating the understood web-like, interconnected nature of reality. Like new insights from quantum physics, the fields of chaos and complexity derived from mathematics and systems analysis, contribute to validate the use of "network" as appropriate metaphor for articulating the nature new paradigm understanding.

Focusing on complex models, theoretical mathematicians highlight the anomalous nature of 'bad old theory' built on reductive models. The development of chaos theory arose from complex fractal mathematical models. In explaining chaos theory, James Gleick (1988) describes the "butterfly effect". Linking similarities with Capra's complex network metaphor, Gleick uses the metaphor to highlight the implications of a tiny cause, such as the movement of a butterfly's wings somewhere on the planet, which may create a chain of events that eventually results in a typhoon somewhere else on the planet. This new rhetorical model shifts from unilinear models of cause and effect, to explain the nature of more complex and chaotic diffuse models. Chaos theoreticians argue that reducing the world to a deterministic, fully causally related system of equations is not possible, because complexity will always overwhelm any system.

These complex, chaotic and process oriented visions contribute to the recognition that there is a need to take into account the great many independent agents interacting with each other in innumerable ways. Attempting to understand the complexity of interactions, chaos theoreticians understood that systems undergo spontaneous self-organisation. This spontaneous self-organisation is noted as adaptive, not simply responding to events passively. Complexity scientists argue this is observed at all levels when moving from the micro to the macro - at the atomic, cellular, organism and societal level. These complex self-organising systems are understood as adaptive in their organisation and reorganisation.

Mitchell Waldrop (1992) describes the nature of these complex, self-organising, adaptive systems as possessing:

> a kind of dynamism that makes them qualitatively different from static objects such as computer chips or snowflakes, which are merely complicated. Complex systems are more spontaneous, more disorderly, more alive than that. All these complex systems have somehow acquired the ability to bring order and chaos into a special kind of balance. (p. 11)

This resonates commonality with insights at the atomic level in quantum physics to frame the nature of reality as essentially complex and organic. Mitchell Waldrop argues that complexity scientists are forging a rigourous alternative to the kind of linear, reductionist thinking that has dominated science since the time of Newton. Along with quantum physics and chaos, insights from complexity contribute to frame the core structure of the new paradigm model as a complex, chaotic and organic. There is strong argument to shift the dominant knowledge metaphor of an inorganic reductive materialistic based building, to knowledge imagined as an organic, dynamic, and interconnected network.

Shift from truth to approximate descriptions.

Chaos and complexity models critically throw a bad light on the shortcomings of the modern paradigmatic experimental approach with its reductive and quantitative, deterministic model of predictability. Experimental methodology is criticised for its pre-conceived claims on theoretical "certainty", and "truth" as a desired and achievable outcome. Explaining why Appleyard (1992 p. 166) says: "Complex systems, even if fully known down to the level of the butterfly's wings, may remain utterly unpredictable". Capra claims to provide a more appropriate model for science:

> Approximate explanations means that you're taking into consideration some of the interconnections but not all. You make progress by including more and more, but you will never get the complete picture. . . . the scientific method; we go from approximate model to approximate model, and we improve the approximations. (Capra and Steindl-Rast, 1992, p. 145)

This "approximate descriptions" model is a somewhat more humbling outcome for a scientific project highlighting the uncertain, complex and chaotic nature of reality. At the same time this uncertain outcome throws out new challenges for new paradigm thinking to comprehend the open nature of knowledge.

In light of this, the conventional representation of the dedicated and isolated scientist in his sterile, white-washed laboratory, immersed with simplified challenges, needs re-framing away from the modern paradigm cultural influence. An alternative image of the scientist as part of a multidisciplinary team, needs to be applied to acknowledge the importance of the new paradigm quest of comprehending and describing "real" interconnecting and chaotic world complexities. These shifts reveal the unattainability of the modern paradigm concept of "truth" and "certainty" when trying to understand a reality with infinite complexity of mutual causality and effects.

In The mind of God, Davies (1992) explains the wide-reaching implications of these theoretical shifts which reveal a common pattern of insights across disciplines and sub-disciplines of science that reframe uncertainty as a new paradigmatic expectations: "Quantum mechanics exposed the subtle way in which the observer and the observed are interwoven. Chaos theory revealed that the relationship between the permanent and change was far from simple" (p.32). Extending his argument further he says:

> It used to be thought that chaos was rather exceptional, but scientists are coming to accept that very many systems are chaotic, or can become so under certain circumstances. . . . Even though chaos is rather common, it is clear that on the whole the universe is far from being random. We recognise patterns everywhere and codify them into laws which have real predictive power. But the universe is also far from being simple. It possesses a subtle kind of complexity that places it part way between simplicity on the one hand and randomness on the other. (p. 136)

With this new emphasis on unpredictability and complex interconnections, Capra argues that claiming approximate explanations means that scientists acknowledge that they are taking into consideration some of the interconnections but not all: "That's the scientific method; we go from approximate model to approximate model and we improve the approximation" (Capra & Steindl-Rast, 1992, p. 145).

These new theories from science, form the basis of a common a pattern underpinning the radically different new paradigm. Writers such as Appleyard, (1992), Birch, (1993), Capra (1975), and G. Ross (1993), point to the cultural specificity of the world view constructed by modern science. In the Tao of physics, Capra (1975) notes the Eurocentric cultural specificity that reinforces the rationale of Western Science. He suggests that new paradigm theory structures a more comprehensive vision of reality. He outlines the similarities between ancient Eastern philosophy and the vision of reality theorised by the new paradigm science, with its emphasis on the holistic and organic, interconnectedness of physical things, and contemporary non-linear physics. While he

describes the new paradigm as systemic, holistic and organic, he adds cautiously that none of these adjectives characterises it completely. The emphasis is on the open nature of new paradigm discourse.

These radical shifts in theory reverberate with theoretical shifts outside of science. Beyond science inquiry focused on understanding whole systems resonates with the holistic and organic approaches of the new paradigm. The new paradigm theory beyond mainstream science expounds further the nature of the revolutionary vision of reality. Examining this holistic vision further undermines the specific cultural power invested in the modern paradigm informed world view and empowers alternate cultural ideology.

2.3 The New Paradigm: Holistic Frameworks - Critical and Theoretical Developments.

The modern world view is according to Birch (1993), derived from the Scientific Revolution, the Enlightenment and the Industrial Revolution. Birch claims the modern world view articulates an interconnected tripartite discursive relationship between the theories, values, and practices of science and technology, economic theory, and philosophy and culture. Similarly in the late twentieth century the new paradigm world view is emerging and reverberating across diverse discussion beyond science. Its influence links to new theory, and cultural ideology, as the shifting paradigmatic lens adjusts and retracts to focus and construct a new 'holographic' vision of reality.

Concurrent with scientific change, is an array of new and critical theories which question the assumed 'progressive' value of its applied technology. Critical approaches interrogate the outcomes of narrow and deterministically framed technology where the criteria for affirming solutions is based on simplified, linear models. Highlighting who modern paradigm science speaks for, various critical discourses identify the power given to the patriarchal and Eurocentric values underpinning modern paradigm framed culture.

New feminist and ecofeminist social theory identifies the rise of women's, and other cultural and indigenous peoples' voices, to give voice to alternative and oppositional 'windows on reality'. This new theory is often articulated in radical and revolutionary rhetoric. This mode of mediation links with post-Kuhnian understanding of the way a paradigm shift is legitimised by revolutionary rhetoric focused on delegitimising the 'bad' old theory.

These various critical perspectives in the social and cultural field link with radical new theoretical developments in the fields of biology, ecology and economics informing the validity of the new paradigm. Henderson (1991) identifies six holistic principles underpinning a new paradigm "post-Cartesian" scientific world view. These principles expand understanding of the implications of the core structure of the new paradigm's meanings beyond new science.

Henderson's holistic framework is based on an organic, global view, and biological and systemic life sciences, rather than inorganic, static, equilibrium, mechanistic models articulated from the modern paradigm. She nominates the holistic principles of interconnectedness; redistribution; heterarchy; complimentarity; uncertainty; and change, as the key principles framing new paradigm holism. Each of these principles interweaves to mobilise this new perspective. These principles are used to discuss relevant contributory perspectives that articulate alternative holistic new paradigm insights beyond science.

Interconnectedness.

Practical research outcomes in biology highlight the unforeseen outcomes of man's attempts to dominate nature through models framed by the modern paradigm. Rachel Carson's (1962) book Silent spring, serves as a cautionary catalyst triggering new environmental perspectives. Her work, drawn from the combined data of the effects of agricultural pesticides, extrapolated beyond available data to underline the fact that pesticides might be carcenogenic and cause chromasomal damage. This observation dramatically alerted the world to the potential dangers of pesticides as biocides, harmful to people, plants and animals. (Rosser, 1991)

This work drew attention to the failings of narrow focus, and the limitations of such practice and solutions of traditional science in the domain of agriculture, with its underlying domination of nature assumptions. The effect of this work was to open up research into the anomalies of agricultural practice and the need to explain the nature of complex ecological systems. Ecological research reveals how practice framed on simplified models has very limited success when viewed in the longer time frame.

Increasingly, other specialist modernist domains come under criticism for their narrow focused models. Mimicking the methodology of science, modern economics is criticised for its entrapment in a nineteenth century reductive, inorganic mechanical view of the world and for its preoccupation with reductive quantified models. Engaging critically with this, Hamilton (1994, p. 5) says economies "are living systems. That is not simply to say that they are dynamic -machines are dynamic too - but that they revolve around living human beings who often behave in impulsive, chaotic and whimsical ways". Focusing on the complexity of interconnections in economic factors, economists influenced by the new paradigm argue that modern paradigm models that frame simplified economic rationale and quantification are no longer valid.

The way disciplines are fragmented within the academy reflects the powerful impact of the modern paradigm within institutional practice. Futurist, Henderson (1991) calls for theory and practice that links both micro and macro interdisciplinary rationales. The social implications of understanding the nature of interconnectivity between ecological and economic systems, for

example, calls for social models based on "planetary cooperation of human societies", and planning based on whole "living systems policy models" (p. 99).

Redistribution

Barbara Ward (1972) says of the work contained in Carson's (1962) "epoch-making book" which in 1995 was voted in the British Observer one of the ten most significant works of the twentieth century:

> we find the bewildering degree of interdependence of natural systems. Toxic materials cannot be put into either air, water or soil without their reappearing in the other two. This interdependence extends to all creatures in the three elements (p. 108).

Ward's statement highlights the problems of distribution, redistribution and interconnectivity of effects in a complex organic ecological system.

Holistic research attempts to comprehend the ways local systems, ecological or economic, effect each other further implicating on global systems. Early ecological based debates focus on to the issues of population pressure and the finite nature of global resources. Questions arose around the realities of feeding rapidly growing global populations. Exploring a more holistic interdisciplinary discourse, emerging new paradigm thinking surfaces in works such as the Club of Rome's Limits to growth (1970); Ehrlich's The population bomb (1971); economist, Ward and scientist/philosopher Dubos' Only one earth: The care and maintenance of a small planet (1972); and radical economist, E.F. Schumacher's (1974) Small is beautiful: A study of economics as if people mattered. These early and influential works foreground the inequity of resource allocation and usage, and the environmental consequences of the pursuit of the modernist goal of growth, signified as continuous progress.

Ward and Dubos (1972) in summarising the distribution problem say:

> Mankind has still found no organised system for reconciling the driving demands and ambitions of national statehood with the wider unities of a shared planet...Within affluent economies, minorities who are handicaped by ethnic prejudice or age or sickness tend to be left behind to observe vicariously on television how the luckier one quarter live. And in planetary society as a whole it is three quarters who live badly as their numbers rise with little prospects of living better. (pp, 65-66)

Some thirty three years later the problem is cumbersomely grappled with, but the new paradigm informed ecological, economic, and social planning holds the greatest hope for those left to observe.

Critiquing the modern paradigm economic discourse, Hamilton (1994) points out that the reductive economist's archetypal consumption decision ignores a most fundamental feature of economic decision making in reality - power, and the inequality of power that goes with the

inequality of the distribution of wealth: "The stock reply of economists when confronted with the fact that certain courses of action will favour the rich is to claim that questions of distribution are outside their field" (p. 29). A more holistic approach engages more equitably with the broader complex issues of redistribution of causality and effects.

Modern paradigm framed progressive science and technology laid claims on liberating "us" from such things as disease, reduced childbirth mortality, increased longevity through better medicine, developed more productive agriculture, and significantly increased standards of living. However this progress was not for all. Highlighting the inequities of resource distribution Henderson (1992) calls for the application the new paradigm holistic principle of redistribution in the social arena. She promotes the social implications of holistic planning social systems built on the concepts of "justice, equality, balance, reciprocity and sharing" (p. 99). These more equitable social planning concepts interlink with new paradigm understandings of the nature of the distribution and redistribution of effects understood in environmental systems.

Heterarchy.

Prior to the 1970's, under the influence of the modern paradigm, earth scientists viewed life on the planet as primarily passive, responding to non-living forces like violent eruptions, severe storms droughts, and even the drifting of continents. Bio-scientists Lovelock and Margulis (1974) describe the biotic control mechanism, that maintains the earth's climate at temperatures suitable for life. Engaging this control mechanism, the "biota can effectively and directly manipulate the environment for its own purposes, or that life optimises its environment to suit itself" (Schneider, 1990, p. 6). Lovelock, on the suggestion of writer William Golding, called the hypothesis "Gaia" after the classical Greek word for Mother Earth. Significantly, an important feminine mythological representation re-entered the masculine dominated world of theoretical explanation of the nature of the realities of life on earth.

The Gaia hypothesis provides an important counterpoint to the predominant evolutionary view that environment dominates life. With it comes the recognition of the importance of whole system studies; the need to look beyond the narrow fragmented disciplines of biology, climatology, geophysics and chemistry etc, to what has become 'global change'. Darwin's evolutionary theory applied to forms, whether plant, animal, human, or societies built a competitive model framed on the processes of 'natural selection' and 'survival of the fittest'. The Gaian research emphasises that co-operative behaviour among all species is critical to survival. Gaia identifies a shift from the apparent naturalness of dominant hierarchical evolutionary concepts, to value co-operative heterarchical evolutionary concepts.

Henderson, quoted in conversation with Capra (1988), says of the failings of Social Darwinists with their hierarchical and competitive models:

> Where (they) went wrong is that they looked at nature with a very gross eye and saw only the redness in tooth and claw. They only saw competition. They did not see the molecular level of cooperation because it was simply too subtle. . . . The cooperation that exists, for example, in the nitrogen cycle, in the water cycle, the carbon cycle and so on. All those examples of cooperation that you could not have expected the Social Darwinists to notice, because they did not have the appropriate science. They did not see all those cyclical patterns that are characteristics of biological as well as social and cultural systems. (p. 285)

Gaia calls for a new approach to view the organic parts of the planet as integrated systems that are to be studied at the various levels of aggregation. This approach reveals that in every ecosystem competition and cooperation are always in a dynamic balance. The nature of this balance is better understood by the principle of heterarchy, rather than the modern paradigm principle of hierarchy.

The cautionary implication of the Gaian hypothesis is that if humans destroyed themselves and degraded the planet severely, life in some form would continue on the planet. With this idea the holistic health of the planet becomes critical for human survival. Once again the centrality and power of mankind's position on earth is of reduced significance, and conversely humanity is viewed as a key threat to that dynamic homoeostatic health. However humankind can no longer be positioned as outside of nature. The knowledge implicit in Gaian theory links to the interconnected visions of premodern cosmology and culture.

Claims made around mastering nature are somewhat humbled by this knowledge. With Gaia the focus shifts to the importance of understanding holistic ecological concerns. The nature of holism, according to Henderson (1991, p. 52) is best served by the underpinning principles of heterarchy: "networks and webs, intercommunication rather than hierarchies; many interactive systems variables; self organisation, autopeosis, and mutual causality".

This view of holistic global environmental reality calls for humankind to be heterarchically re-positioned within nature. Gaia importantly is fundamental to instigate the shift from anthropocentrism to biocentrism underpinning theory and planning. This concept guided by the principle of heterarchy is driving an emerging new ecophilosphy to frame thinking and culture.

Complimentarity

Environmental concerns question the dominant Western attitudes towards the non-human world and consequentially the anthropocentric assumptions of modern paradigm science. New biocentric discourse calls for the repositioning of humankind within nature. Social , economic and cultural systems under new paradigm thinking are seen to behave more like dynamic ecosystems. The systemic nature of the heterarchical dynamic relationships is best understood, according to Henderson (1991), by the principle of "complimentarity". She summarises its contributory

components as very different to that conceived of by modern paradigm logics. The holistic new paradigm principle of complimentarity replaces the discursive rhetorical framing practice of arguments structured on either/or dichotomous logics, and reframes practice with metalogics of "yin-yang" and "win-win", rather than zero sum games.

Dichotomous logics and zero sum games are the cultural instrumentality of the powerful sense of duality - the separation of ourselves as individuals from the world around us - formed by the modern paradigm. Wajcman (1991) outlines the way feminists have characterized the conceptual Western dichotomising as distinctly masculine. The effects of this she says are:

> culture vs. nature, mind vs. body, reason vs. emotion, objectivity vs. subjectivity, the public realm vs. the private realm - in each dichotomy the former must dominate the latter and the latter in each case seems to be systematically associated with the feminine. (p. 5.)

Her book Feminist Approaches to Technology points to the ways these dualistic metaphors are underpinned by claimed value-free scientific thought. Ecofeminist theory spurns this patriarchal ideology and practice. They emphasise the win-wins to be gained through knowledge and practices that holistically focus on heterarchical connections and behold the rest of nature as subjects, not objects. For ecofeminists the root of "the problem is not that women have been identified with nature, it's that in our culture we devalue nature and want to be seen as separate from it" (Adams, 1994).

Radical economics writers such as Henderson (1991), Hamilton (1994), and Jacobs (1991), join with ecofeminists to highlight the economic implications of the cultural instrumentality of dualisms. New paradigm informed economic, social, environmental theory arguing sustainability of systems, critically focuses on the failure of "rational" economic modeling and quantification to take into account measurement of the productivity of women, and to place an economic value on finite environmental resources and rising pollution costs. Dichotomous arguments invariably fail to take into account the "feminine" side of the binary argument as highlighted in Wajcman's (1991) concepts of nature, body, emotion, subjectivity, and the private realm. These concepts are excluded in formulating the discursive logic of the modern paradigm informed social and environmental models.

Critical focus on the specificities and ideological limitations of the rhetorical modes and generic conventions that structure dichotomous arguments used to communicate its version of reality, highlights the limitations of modern science's discursive nature. Outlining the limitations of science's rhetorical modes Markley (1992) says:

> Realistic accounts of science cling to the idea of transparent, denotatively precise language that is set implicitly against the muddle of literary language and other non-scientific languages. Realistic schemes of representation concentrate their energies on settling questions of "right" or "wrong", and therefore they must

> view disagreements amongst scientific theories as contests between truth and falsehood, between "correct" and "incorrect" interpretation of data. (p. 623)

These modern paradigm rhetorical practices appear to be more concerned with reaffirming specific hegemonic cultural power than rhetorical frameworks for holistic understanding. For Henderson (1991, p. 66) the social implications of the new paradigm holistic principle of complimentarity moves to frame arguments built on "unity and diversity, from either/or to both/and logics."

Uncertainty

Physicist Werner Heisenberg developed the "uncertainty principle" to describe the the atomic process Mclaughlin and Davidson (1994) describe as:

> Electrons sometimes behave like waves and sometimes like particles in different situations. The more precisely one dimension, such as a position or velocity (momentum), is fixed by the physicist's observation, the more the other becomes uncertain. . . . This means that neither the electron nor any other atomic "object" has any intrinsic properties independent of its environment or of those observing it. (p. 23)

This sense of uncertainty confirmed at the micro atomic level links with the uncertainty envisaged in larger complex systems whether mathematical, ecological, economic or social.

Drawing models from Gaian theory, chaos theory, complexity mathematics and applying the principle of uncertainty to frame new holistic models, the nature of this uncertainty is explored variously by ecological theory, radical economic theory, feminist theory and ecofeminist theory. Henderson (1992) identifies the principle of uncertainty as fundamental to a new post-Cartesian world view. In her words this principle is derived from "static, equilibrium, and mechanistic models to probalistic, morphogenic, oscillating and cyclic models". From the biological view uncertainty is an essential characteristic of "self-organising, self referential living systems" (p. 52). At all levels - both micro and macro - there is uncertainty in all complex systems.

As a futurist, she argues that the social implications of best coping with and planning for this inevitable uncertainty is for knowledge discourses, societal structures, and management strategies to incorporate uncertainty into its models. The way this is managed, she argues, is by employing "many models, viewpoints, compromise, humility, openness, evolution, and learning societies" (p. 66). With uncertainty underpinning this new paradigm project to map the new frontiers of knowledge, theorists call for holistic research to map macro-rationality in order to enable understanding of the "order, pattern or causality at the heart of the most random or chaotic event". (Mclaughlin & Davidson, 1994, p. 25).

The principle of uncertainty highlights the probability of failure in models to incorporate all factors when dealing with complexity. When engaging with complex global systems uncertainty is inevitable, and with so much at risk, this uncertainty needs to be included in models.

Change

Finally Henderson (1991) identifies the holistic principle of change as fundamental to constructing a holistic world view. This, she argues, must involve "focus on irreversible phenomena as well as traditional reversible models, evolutionary view, macroscopic time/space, change as fundamental, certainty as limited" (p. 52). Incorporating the concept of change to the social arena, she outlines the social implications of the "redesign of institutions, perfecting the means of production, changing the paradigms and values" (p. 66). In comprehending the complexity of organic, dynamic and chaotic systems, change is understood as inevitable; change is understood as an essential part of the vital, organic, and dynamic nature of reality.

These key holistic principles when applied to understanding and describing ecological, economic and social systems augur the necessity for changes to cultural values that are biocentric and attempt to reposition humankind within nature. Critical writers engage with the dominance of anthropocentric, androcentric and Eurocentric cultural values and practice which serves to strengthen the underpinning modern paradigm rationale. New paradigm informed writers construct alternative and radically different ecoculturalist values and models. This different thinking links with a third 'ecological' part for understanding the nature of the radically different ideology derived from the new paradigm.

2.4 The New Paradigm: The Ecological Framework.

Evaluating anthropocentric values, ecofeminist critics note the androcentric bias of traditional science, which they claim has distorted its theory and practice, and expose it as largely related to issues of power in patriarchal society. Addressing the impact of patriarchal power Merchant (1992) says:

> In investigating the roots of our current environmental dilemma and its connections to science, technology and the economy, we must re-examine the formula of a world-view and a science which, by re-conceptualizing reality as a machine rather than a living organism, sanctioned the domination of both nature and women. The contribution of such founding "fathers" of modern science must be re-evaluated. (p. xvii)

From a cultural perspective, Said (1978, 1994) adds indigenous and other non-European peoples to this ecofeminist's identification of those groups under the domination of Eurocentric patriarchy.

The new paradigm informed discourse and radical social and cultural change are part of a widespread re-evalutation in Western society. The radical nature of this new project heralds for modern paradigm values and practices a "crisis of culture in the broadest sense of the term; that is the total of inherited ideas, beliefs and knowledge, which constitute the shared basis of social action" (Eckersley, 1993, p. 20).

It is not surprising, Henderson (1991) argues, that with rising dissatisfaction with modern paradigm based 'aesthetic materialism', the last thirty years have seen Westerners roam the earth in search of other cultural and religious traditions which were not dominantly anthropocentric.

> Thus elements of Buddhism, Taoism, Hinduism and Islamic traditions were combined with ecological wisdom from many ancient indigenous cultures, from Australia's Aboriginals to Native American. These were, in turn interwoven with insights glimpsed from the prehistory of neolithic matrilineal worshippers of the Great Mother Earth, in all her iconic forms, by Neumann, Gimbutal, Campbell and Eisler. (p. 72)

This cross-cultural searching links with the spiritual and social experimentation involved in the alternative social movements within Western society. In accord with with these cross cultural explorers, writers such as Birch (1990), Capra (1975, 1992, 1993), G. Ross (1993), and Roszak (1970, 1993), engage with insights beyond anthropocentric, androcentric and Eurocentric cultural and spiritual practice to offer alternatives that embrace holistic and ecological models. This pursuit of alternative non-Eurocentric and non-anthropocentric informed cultural expression frames both personal and societal contemporary concerns.

Linked to this alternate cultural expression is the alternate values and practices articulated in the changing attitudes and lifestyles of grassroot movements such as the environmental movement, the anti-nuclear peace movement, the women's movement, the new age or holistic health movement, and indigenous peoples' and other people's liberation movements. The motive for this alternative cultural searching is underscored by the collective and individual perception of the emergent "crisis of science and technology; the crisis of 'nature'; and the crisis of materialistic individualism" (A. Ross, 1991. p. 21).

During the past thirty years within the academy the impact of the organic, holistic and ecological nature of new paradigm models has reverberated to reframe understanding and theory across various knowledge discourses. Engaging with this, sociologists Jagtenberg and D'Alton (1989) call for social space to be seen four dimensionally - class, ethnicity, gender. and nature/environment. "In fact, any understanding of the inner relationship between fellow humans, plants and animals must involve an understanding of the human values and behaviour, and the full psycho-social context of humanity's continuing use and abuse of the environment" (p. 6). The impact of this nature/environment "fourth dimension" cuts across social, psychological, spiritual and economic boundaries.

Reflecting the rise of the new ecoculturalist trends, Roszak (1993, p. 16) points to the use of the prefix 'eco' affixed to many words. 'Ecopolitics', 'ecophilosophy', 'ecotheology', 'ecofeminism', 'ecoconsumerism' and even 'ecoterrorism'. The result, says Rosazk, is not always graceful, but the gesture is nonetheless significant as a sign of the time. The addition of this 'eco' prefix rhetorically

points to widespread theoretical attempts to apply the new paradigm ecological based logic and arguments to synthetically connect and reframe a wide range of knowledge discourses, not only within the academy, but wider to popular cultural discourse.

Promoting the value of ecoculture, Merchant (1992) focuses on developing a framework for identifying those ethical values which underpin our relationship with nature. She nominates three ethics positions that form the basis in which various groups have struggled over land and resources as "egocentric"; "homocentric"; and "ecocentric". Elaborating further on these values she explains:

> An **egocentric** ethic (grounded in self), for example, is historically associated with the rise of laissez faire capitalism and the mechanistic world view. A **homocentric** ethic (grounded in the social good) underlies those ecological movements whose primary goal is social justice for all people, such as social ecologists, left Greens, social and socialist ecofeminists, many Second and Third world environmentalists and the mainstream sustainable movement. An **ecocentric** ethic (grounded in the cosmos or the whole system) guides the thinking of most deep ecologists, spiritual ecologists, Greens, cultural ecofeminists, organic farmers, bioregionalists, and most indigenous people's movements. (p. 82)

The third "ecocentric" category includes those radical groups whose values reflect new paradigm informed attempts to reposition humankind within nature. They articulate various ways of pursuing sustainable ecocentric values and practices. The primary question when identifying ecocentric values concerns determining our place in nature. This question must be answered before questions regarding the determination of the most appropriate social and political models for optimising the various relationships in human communities.

Merchant's three categories of values that identify our relationship with nature structure the third ecological framework to add to Capra's scientific characteristic framework and Henderson's holistic principles framework. These three frameworks structure a complex model that this thesis uses to engage with the multidiscursive nature of the new paradigm and its underlying meanings. This model enables this thesis to engage with three dimensions of the nature of the new paradigm as they inform a radically different vision of reality.

Addressing the critical implications of this new revolutionary thinking derived from both new paradigm science and supported by theory beyond science, Roszak (1993, p. 97) says: "All of us use the power of science; we rely upon it as fully as primitive folk relied upon their skill at tracking game, or foraging in the wild. Nothing now stands a better chance of uniting us as one human family".

Despite the optimistic nature of Roszak's new paradigm vision, with the conventional power of the modern paradigm to dominate theory and institutional practice in Western society, and with significant hegemonic power attributed to modern paradigm values, are cultural products

able to engage with and mobilise the values of the radical and alternative new paradigm? Henderson (1991) states with great chagrin that too often the new paradigm narratives are told in modern paradigm stories. This thesis' essential research project lies in applying the three scientific, holistic and ecological frameworks outlined to the investigation of the paradigm framing underpinning the 'stories' told in science texts on television.

2.5 Summary

In summary, this thesis proposes three frameworks to structure a model for engaging with the emergent revolutionary new paradigm. Capra's scientific framework nominates the key binary characteristic components that trace the shift in the visions of the nature of reality from the modern to the new paradigm of science. He outlines these as moving from part to whole; from structure to process; from objective science to "epistemic" science; from building to network as metaphor for knowledge; and from truth to approximate descriptions. This scientific framework enables the identification of the characteristics of scientific discourse.

Adding to the organic nature of new paradigm science Henderson's holistic framework nominates those "post-Cartesian" principles which mobilise new paradigm models beyond science. She articulates these as being: interconnectedness, redistribution, complimentarity; uncertainty and change. This "holistic framework" enables the identification of the principles articulating wider discursive engagement with new paradigm informed theory and practices beyond science.

Finally Merchant's third ecological framework nominates three categories for positioning ecological ethics. These values in moving towards new paradigm informed values, shift from egocentric to homocentric to ecocentric. Those incorporating ecocentric characteristics structure ecoculturalist values mobilising the alternative new paradigm informed culture.

These three frameworks interlink to provide a multidiscursive and complex analytical model for identifying the scientific characteristics, holistic principles and ecological values of both the dominant modern paradigm and the revolutionary new paradigm. This thesis is a media studies project. New paradigm logic and rationale impacts upon the theory and methodology of media studies discourse. A Paradigmatic discursive shift is identified within the theory and rhetoric that frames the evolving media studies' project. The next chapter engages with this.

Chapter 3.

3. Media Studies

The disciplines of cultural studies and media studies offer various theories to engage with the ways meanings are woven into texts. This chapter discusses the ways the theoretical perspectives that constitute the overlapping cultural studies and media studies field variously reflect the changing impact of the modern paradigm and the new paradigm.

3.1 Paradigm Frameworks - Articulating Change.

While the field of cultural studies and media studies position beyond the boundaries of science, their theoretical frameworks rhetorically reverberates with the values and practices of science. Epistemic approaches to the language, methodology and theory of both science and the humanities reveals how fully the paradigmatic assumptions of modern science have been embraced and incorporated into the discursive framing of the field.

For Carey (1989) the real strength of contemporary cultural studies lies in moving beyond what he calls an "outmoded philosophy of science", to focus on "mass media as a *site* on which to engage the general question of social theory". Expanding on this further he says:

> The production and reproduction of society is never guarantied, automatic or mechanical, and the problematics of the phenomenon are often best revealed in moments of conflict and contradiction, and in the rare but powerful episodes of cohesive violence, social disorder and chaos. But whatever the details of the production and reproduction of social life, it is through communication, through the integrated relations of symbols and social structure, that societies, or at least those with which we are most familiar, are created, maintained and transformed (p. 110).

Carey's ideas are rhetorically engaged with the organic nature of new paradigm understanding. The language points to the challenges of understanding the complex, organic and chaotic nature of the processes of cultural maintenance and change. He also highlights the modern discursive power attributed to what he calls that "outmoded philosophy of science".

Critical discussion of the limitations of modern paradigm perspectives, has been vital for both the formation and maintenance of the radical nature of the project of the field. Mobilising new paradigm approaches, Carey's call for a discursive shift, has accord with the anti-modernist, "counter culture" thinking reflected in the early works of writers in Britain such as Hoggart (1957), and later Williams (1958, 1961, 1962). These writers' works shift the dominant focus of to popular culture. This new study site was underpinned by the desire to position cultural products in a heterarchical 'equal playing field'. The nature of this strategy contrasts with the dominant hierarchical evolutionary Social Darwinist influenced focus on 'high' or 'elite' culture.

Similarly McLuhan (1962) focuses on mass media as a site to identify the discursive link between technology, the modern paradigm and cultural practices. He argues that the linear forms of print-based communications as dominant cultural form, account for the linear development in music, mathematics and the sciences. McLuhan hypothesizes that the outcome of this early communications revolution was an anthropocentrism in man, and fragmentation in society, that in turn led to chauvinism. Critical debates continue to variously engage with the link between anthropocentric, androcentric and Eurocentric values and culture, and the modern paradigm.

Paralleling this radical stance which links with the new paradigm, the impact of the modern rationale of Western science on the theory and methodology of the field has been powerful. Capra's binary key characteristic components tracing the scientific paradigm shift from modern to new framework, provides a model to track the ways the field rhetorically and ideologically reverberates the core structure of the two models.

3.2 Media Studies Discourse: The Scientific Characteristics.

Capra's first key scientific characteristic component for tracing the paradigm shift is the movement from part to whole. Under the influence of the modern paradigm, theory and research focuses reductively and fragmentedly on models of communication reduced to the component parts: the producers, the text and the audience. The participants in communication are conceived of as framed on uni-linear deterministic models. Specialist attention concerns the further reductive dissection and analysis of the separate component parts to communication. Pursuing fragmented models, specialist researchers focus on quantifying the 'effects' of different communications technology, the 'effects' of the text as ideological message, and audience as passive suppository site for further measurement.

Under the influence of modern paradigm discursive institutional practices, the field is categorically divided into parts. This reflects in the divisive territorially bound nature of disciplinary rhetoric and theory. The field is further divided into reductive categories such as media technologies; media effects; discourse analysis; genre studies; gender studies; audience studies. Alongside this divisive institutional and disciplinary discursive practice there is rising acknowledgment of the ways these study areas interweave and interconnect mobilising greater potential understanding of the whole cultural studies project.

There is movement within the field away from a previous narrow, reductive and often specifically text based focus, to a more holistic attempt to understand the implicit communications model as a whole. With this holistic approach, the cultural product is repositioned in an interactive contextual relationship with producer and audience in a 'real world' setting. In the same way that modern paradigm physics focused on atomic particulate matter, and the new paradigm informed quantum physics' interest shifted to understanding the organic processes that

connect and impact upon the parts, contemporary new paradigm sympathetic theory shifts its emphasis from the part to the whole. Emphasising the shift in this direction, McLeod, Kosiski, & Pan (1991) argue in favour of focussing on the process of meaning production within the fabric of culture.

Capra's second key scientific characteristic component for tracing the paradigm shift moves from structure to process. The shift towards a holistic model highlights the need for enquiry to engage with the ways the component parts interact and interconnect. These processes enable theoretical discussion on the complex ways meaning production is woven into culture. Similarly to McLeod et al. (1991), Turner (1990) confirms that the main interest of cultural studies is no longer simply in texts, or even institutions, or social practices, but rather in the investigation of those complex processes that articulate any or all such elements within and into culture. These concerns express a desire to shift the focus of the project from structure to the process. The emphasis is on recognition of complex, process oriented nature of the relationship between social context, producer, texts and audiences.

Critiquing the dominant discursive model of the modern paradigm, culturalist, Said (1978, 1993), draws attention to the limitations and closure of reductive perspectives and practices in the cultural sphere. In these works he highlights how modern framing has resulted in the dominance of Eurocentric cultural values. Borrowing from Gramsci's work on hegemony, noted theoretician, Hall (1992) argues the merits of more process oriented "organic" approaches to ideology and meaning in the discipline. Similarly to Said, he points to the limitations of simplified linear reductive models. These writers' rhetoric calls for pro-active critical engagement with holistic and organic approaches to the processes of articulating meaning into culture.

The inquiry into the nature of these processes shifts the discursive model from one of unilinear determination concerned with dissecting the structural tripart relation between producers, texts and audiences to frame understanding. New quantum physics gained much insight into the nature of reality by shifting its focus from inorganic particulate matter to focus on the organic process the connects and interconnect participles. So too, a similar shift emerging in the field leads to more process oriented insights. Mirroring the paradigmatic shift in understanding in the nature of systems from structures to process, contemporary discussion articulates the nature of these interweaving, and interconnecting processes with a more organic complex diffusion model with feedback characteristics.

Capra's third key scientific characteristic component traces the paradigm shift from objective science to epistemic science. With a diffusion model of the communication processes underpinning enquiry, the complex and chaotic nature of this becomes apparent. The role of the observer in this process becomes irrevocably intertwined. This position highlights the need to

acknowledge the impact of subjectivities in both the production and reading of meanings. The concept of objectivity is problematic.

In stark contrast with this new paradigm informed perspective, modern paradigm science's verifying experimentation and methodology was structured on the assumption of achievable objectivity. This assumption enabled powerful claims on laws based on the concept of value free or value neutral observations. These claims structured theoretical knowledge as 'truth'. Brett (1991) writes of the problems created by this empirical quest for certainty within the humanities. She draws attention to both the formal and conceptual dangers. With the entrenched value of the modern paradigm scientific model, the consequence of the traditional bureaucratization of writing and knowledge within the academy, is goals of inquiry framed by hegemonic discursive practices.

According to Brett (1991), as in science, these practices are built on the ideological pursuit of empiricist and positivistic models of "truth":

> Commitment to truth and objectivity has a deep affinity with bureaucracy's ideal of the impartial applications of rules and regulations. . . . Particular disciplines are seen as particular ways of approaching the truth, particular ways of ensuring objectivity. . . .The humanities does not seek truth but understanding, and while concern with objectivity is an important one, it can easily become an end in itself. . . .The bureaucratic university combines with the organisation of knowledge into disciplines to disconnect writers from both a public and their own subjectivity. (pp. 518-19)

As Heisenberg's 'observer' theory in quantum physics notes, the observer and the observed are always powerfully interconnected and intertwined. Recognition of the impossibility of disconnecting the observer from the field, calls for a shift towards the acknowledged appropriate nature of epistemic approaches.

Discussing the role of declared subjectivities in research, Carey (1989) states that rather than claiming objectivity, the purpose is:

> to see truth and knowledge not as some objective map of the social order, nature speaking through us, but, in a lovely phrase of William James, as that which is good by way of belief, that which will get us to where we want to go (p. 94).

This taxonomic sense, according to Carey, echoes the Platonic distinction between knowledge and opinion, between objectivity and subjectivity. He argues that it is this distinction which cultural studies seeks to dissolve.

Extending this purpose, Carey critiques the usage of methodology laying claims as objective science underpinning the motivation of early American studies of communication, both mass and interpersonal. He argues, they "have aimed at stating the precise psychological and sociological conditions under which attitudes are changed, formed, or reinforced and behaviour stabilised or redirected" (p. 44). Borrowing modern scientific framing, the emphasis was heavily

on the quantification of effects in an attempt to lay detached or objective claims on the predictability of behaviours. However Carey adds that "rather than this desire to establish laws that explain human behaviour, cultural studies' project attempts to understand it rather than predict behaviours, it attempts to diagnose human meanings" (p. 56).

The nature of the disciplinary project shifts to focus on the process of meaning articulation. This project is better served by theoretical models framed as epistemic science rather than objective science. Epistemic science engages with models of the collective processes - perceptual, intellectual and linguistic that frame holistic knowledge.

The theoretical models of the field are sourced multidiscursively from literature, history, sociology, psychology, linguistics and semiotics. This multidisiplinary sourcing implies opportunity for open discursive models based on epistemic science. These input reflect potential in collaborative mapping out and comprehension of cultural complexity. That complexity is understood as involving an organic and dynamic relationship between producers, texts and audiences in meaning production. However with the hegemonic power invested in the modern paradigm to frame theory and institutional practice, as discussed by Brett (1991), there is resistance to this potential collaborative synergy of discourses. Hall says: "discourses are not closed systems. A discourse draws on elements in other discourses, binding them into their own network of meanings" (in Hall and Gibben, 1992, p. 292). This multidisiplinary sourcing theory identifies the project as articulating an ideological struggle between closed modern paradigm discourse and more open epistemic discourse.

Capra's fourth key scientific characteristic component traces the paradigm shift from building to network as metaphor for knowledge. The field's modern paradigm discursive framework reflects the metaphor of building for knowledge with unilinear deterministic models structured on inorganic, fragmented and reductive models. This is evident in unilinear and deterministic approaches to measure media effects. By contrast more complex, organic diffusion models with noted feed-back characteristics for the investigating the articulation of meaning into the cultural communications process, structures a network as a more appropriate metaphor for more evolving and open discursive knowledge. A network model acknowledges the dynamic nature of meaning production between producers, texts and audiences. This shift from building to network resonates the nature of a new paradigm project.

Capra's fifth key scientific characteristic component traces the paradigm shift from truth to approximate description. Modern paradigm framed theory and methodology pursuing knowledge and outcomes claimed as truth is now perceived as problematic. The closed nature of this is what Carey (1989) describes as "an outmoded philosophy of science". The inappropriateness of truth as outcome of discourse analysis is focused on by Allen (1992). He speaks of his concern in the area of discourse analysis on television. While analysis reductively focuses on a cultural product, this focus

is underscored "with the belief that the relationship between the viewer and television are so complex and multidimensional, that they resist all attempts to reduce them to phenomena that can be explained by the same procedure that work for the chemist" (p. 16).

Allen rejects the value of research based on the simple, linear and deterministic cause and effect models between texts and audiences. The chemist's quest for theory or equations deduced in laboratory research is based upon reductive methodological frameworks used by the scientist to formulate claims of certainty and truth. This is achievable through the limitation of both input factors and environmental conditions. This closed experimental, simplified and reductive model serves to validate both researcher and methodological framework through findings claimed as truth.

In the area of textual theory and analysis, Fiske (1987) and Hartley (1992) discuss how closed generic modes of address and representational strategies such as in news, current affairs and documentaries are used to direct readings and preferred meanings. These strategies are used to confer onto the preferred meanings the value of truth, and empower and authorise their point of view. Despite structural attempts of producers to direct readings, meaning is both individual and collective, underpinned by psychological, social, and geo-cultural values. With such a complex and chaotic territory to map, knowledge is better understood as approximate descriptions, rather than truth.

However under reductive modern paradigm influence, audiences are conceived of ethnographically as closed recipient communities. In constructing imagined communities, the modern paradigm links to a simplifying assumption of a unified subject attributed to unified reading strategies. Theory based on a unified reading position ignores the multiplicity of subjectivities involved in individualistic reading practices. However David Morley's (1980, 1986) work initiates the movement to re-empower audience positions and movement towards more complex and networked models.

Tackling the limitations of modern paradigm models, Rosalind Brunt (1992) critically engages with the limitations of empirical attempts to construct audiences through formal ethnographic categorisation. She argues that the use of this convenient reductive and closed framing strategy is problematic because the real complexity of each group, and their collective decodings of the television text is not an object to be investigated, but a problem to be circumvented in order to discover consistency and similarity of perspective within groups. This methodological simplification of audiences links to the pursuit of certainty, predictability and truth, and the discursive powers associated with such claims.

Brunt's (1992, p. 74) interest lies more in the position that "decoding" represents not a finished, mechanical product, but a process, a collective engagement, working with, and through a

text. Using this model audience studies moves beyond the concept of audience as a mechanistic linear determined structure to theorise the complex processes involved in reading practices. New understandings acknowledges the "chaotic" nature of reading practices. This shift from linear structure to organic and potentially chaotic process in audience studies, recognises the complexity of the nature of the relationship between readers, texts and reading practices.

Understanding the complexity underpinning this communications model, knowledge in the field is best mapped by holistic approaches with outcomes seen as "approximate descriptions". Explaining the nature of this new paradigm scientific method Capra says: "we go from approximate model to approximate model, and we improve the approximations" (Capra & Steindl-Rast, 1992, p. 145). This project is essentially epistemic research with findings' conceived of as informed approximate descriptions rather than "truth".

3.3 Cultural Manifestation of the Discursive Struggle.

This discussion glimpses the shifting theoretical debates reflecting the various impact of the two paradigms to frame theory and practice in the field. A good example to illustrate this struggle is found in the recent works of two writers in the field. The paradigm struggle is revealed by comparing the works of Andrew Ross (1991) and Douglas Rushkoff (1994). Understandings and arguments used in these works highlight the power attributed to entrenched dominant institutional values and practices that hinder the development of new paradigmatic based evolving theoretical and methodological change. They both also engage with resistive subcultural expression. However while some critical cultural voices appear sympathetic to paradigm shift, but closer analysis reveals more modern paradigm 'wolves' disguised in new paradigm clothing.

Strange weather: Culture, science and technology in the age of limits (Ross, 1991), discusses the complex and powerful connections between science and transforming popular culture. It is written as a 'serious' cultural studies text aimed at interpellating an academic audience. Ross discusses contemporary diverse subcultural issues: counter culture, the environment movement, the new age health movement, cyberpunk culture, and futurology etc. He is careful to claim a detached point of view. But his narrative and rhetorical strategies maintains the peripheral positioning of alternative transformational, sub-cultural thinking. While the book is useful for engaging with transformational cultural change, his reductive narrative framing strategy fails to articulate the connection between new science and the changing sub-cultural perspectives.

He structures his argument on modern paradigm logic. The fragmented narrative constructs diverse social and cultural change as "balkanised" separate fields. This results in the disempowerment of alternate voices, of alternative values, of alternative visions of reality, beyond that of the dominant ideology. The reductive focus looks to disengage cultural change as unrelated fragmented parts, rather than focusing on the interlinkages and interweaving of shifting values

and principles that complexly and chaotically interconnect the subcultural ideology to the new paradigm. This disconnected framing strategy closes off and devalues reading alternate meanings to social and cultural change. Sadly, this echoes Henderson's (1991, p. 6) grievance that too often radical alternative strategies are told in old paradigm stories.

In critically reviewing Ross's book, MacKenzie Wark (1992, p. 24) says: "While Ross's analysis is interesting, it could be strengthened by closer attention to the evolution of media technologies and the forms of social and cultural life they make possible". This criticism pinpoints the multiplicity of interconnected component factors that have complexly impacted upon the nature of transformational and subcultural values during the last thirty years. Ross fails to embrace such an approach. With his focus on an academic audience, the radical element in his discourse is overwhelmed by the dominant ideology of its institutional sponsorship.

In stark contrast in a somewhat diffuse, subjective and chaotic narrative style, culture critic Douglas Rushkoff (1994) offers two radical texts:- Media virus! - hidden agendas in popular culture, and Cyberia to engage with contemporary subcultural transformational change and its links to changing media technology in society. While Ross discusses subcultures with a fragmented narrative framing discursive strategy, Rushkoff focuses on specific media technologies as *site* for cultural products to engage with the diverse meanings included. His works attempt to address these issues to both a popular and academic audience.

Rushkoff's narrative form and rhetorical style, particularly in Cyberia with its journalistic exploration of those subcultural groups that engage with cyberculture interpellates a wider popular audience than Ross's book. This strategy aims at involving a wider audience with the societal consequences of media technology change. His journey into the virtual world of Cyberia with its diverse subcultural groups represented, celebrates diverse cultural expression in the "trenches of hyperspace" where the war to change, or maintain preferred cultural meanings is played out.

Extrapolating on the works of McLuhan in Media virus, he links perspectives from chaos mathematics, complexity and Gaian theory, with the new cyberspace communications terrain. Drawing on these models he makes connections between the various shifting values that are woven into the various subcultural groups. His narrative is self-reflectively subjective, employing hypothetical 'approximate descriptions' to theorise radically different models of communications between producers, texts and audiences in debating the nature of contemporary cultural maintenance and change.

Illustrating this, he theorises that the nature of effects and the relationships between producers, texts and audiences is best understood by new paradigm models such as chaos theory. Media effects are described with the metaphor of the butterfly flapping its wing (Gleick, 1988).

Rushkoff articulates the ways new media technologies are best understood by new paradigm models, and he argues they are informing radically alternate social realities and practices. He proposes that the combined "effect" of these technologies constructs a new frontier "virtual" territory for sense-making mapping which he calls the "datasphere".

According to Rushkoff, this datasphere is an extension of nature and the dynamic, chaotic and complex nature of this is best understood by new paradigm science models. This approach leads to a reframing of technology versus nature debates. He proposes that a model for the nature of cultural meaning production in the new virtual territory of the datasphere is best served by new paradigm science informed models of immunology and virology. The purpose of this alternate "viral" meaning when injected into dominant cultural settings is to "infect" meaning, and so break down, and defy the dominant closed strategies of delimiting meaning. The impact of some of these effects linked to new paradigm transformational ideology, he argues, have the power to promote radical transformational social paradigmatic change.

Rushkoff's radical, subjective rhetorical style and strategies chart new territory and mapping technology for discourse in the field. His work offers alternative radical discursive models to engage with new media technologies as site of meaning, and debate the nature of cultural maintenance and change. His radical and empassioned rhetortic echoes the revolutionary rhetoric seen as necessary to legitimise a paradigm shift and overthrow bad old theory. Ross's work rather attempts to resist change legitimise the old paradigm. The works of these two writers highlight the way paradigmatic underpinnings frame debate in a discursive field. They highlight the fluid nature of hegemony in the field. They illustrate the hetergenious way different points of view attempt to "interpret the complex dialectic between institutionally sponsored, technologically mediated ideas, and culturally situated intentional social action"(Lull,1995, p. 3).

3.4 New Directions.

Writers such as Rushkoff join an emerging call for critical engagement with the cultural repositioning of humanity within nature, not separate from it. In response to the call, Slack and Whitt (1992) argue for cultural studies as organic intellectual pursuit to engage with non-anthroprocentric alternatives through adopting critical ecoculturalist perspectives.

> Given the growing appreciation of the nature, scope and implications of ecological interdependence, cultural studies must respond to the political and ethical challenges which that recognition poses. . . .The extension we suggest would open up the terrain for cultural studies to describe and intervene in one of the pressing political, economic and cultural issues of the late twentieth century: the relationship between the human and other-than-human world (p. 571).

Within the values of modernism, the dominant binary opposition model of culture and nature is all powerful. Critical ecocultural engagement with attempts to break down this discursive model and

mobilise reframed ecoculturalist perspectives extend the radical nature of a revitalised disciplinary project.

New paradigm informed scientific, holistic, and ecological models offers challenging multidiscursive models for the field to investigate emerging new paradigm meanings in culture, and actively engage with and critique the limited visions of dominant modern paradigm culture. In discussing the practicalities of factoring economic new paradigm models Henderson (1991, p. 66) says this is done by employing: many models, viewpoints, openness, evolutions, and learning societies. Analysis will reveal if the science culturally portrayed on television reflects the adaptive, process-oriented capacity of hegemony to incorporate change in order to maintain that dominant positioning for science in society.

Chapter 4.

4. Methodology

According to Williams (1989, p. 185) cultural studies "is about the way in which the specifics of works relate to structures which are not in the works". The disciplines of cultural studies and media studies have developed methodologies for identifying the ideologies within texts which articulate to social and cultural ideologies beyond the text. With the power attributed to science in Western society, the paradigmatic structure underpinning science culturally reverberates to structure congruent visions of reality within meanings in popular cultural texts. Those texts employ strategies to interpellate an audience to share in its vision of reality. Do television texts engaging with science extend the consensus about the dominant meanings of science, or are they sites for popular debate around critically examining the meanings and values of science and promote the ideology of the new paradigm?

The project of modernity has been identified as interlinked cultural expression affirming a reductive, fragmented and inorganic world view underpinned by the modern scientific paradigm. The new paradigm structuring a very different vision of reality has emerged from science and other knowledge discourses. This new vision of reality has been identified as fundamentally holistic, organic and ecological. The cultural meanings informed by this vision of reality have been linked to the rising subcultural expression of various radical social movements. The concept of a paradigm shift provides a useful model to engage with the different preferred meanings.

Television texts represents a cultural site for mediation between the dominant ideology of the modern paradigm and the emergent ideology of the new paradigm. Despite the revolutionary nature of the shift in understanding of the vision of reality informed by the new paradigm, hegemonic theory provides the social and cultural model for social and cultural change to occur without a disruptive revolution. Giving a voice to new paradigm meanings within these texts, and thus articulating the paradigm shift, maintains the dominant hegemonic power for science in society.

Research Questions.

*Accepting that there is a paradigm shift in science moving from the modern to the new paradigm, is this shift identifiable in the meanings represented in various contemporary television science texts?

*Do modes of production and modes of address interlink to structure regimes that maintain the dominant positioning of modern paradigm meanings in television science texts?

***Do modes of production and modes of address interlink to structure regimes that promote new paradigm meanings in television science texts?**

***How do different texts address and interpellate their audiences?**

Research Methodology and Model.

This thesis applies a multidiscursive methodological approach for identifying the representation of the modern and the new paradigm ideology in cultural products. Applying Capra's scientific characteristic model, Henderson's holistic principles, and Merchant's ecological values to textual analysis enables the identification of the radically different preferred meanings within the structural and rhetorical framing practices communicated.

The meanings structured by the two paradigm frameworks may be identifiable in the text's production formations, modes of production and modes of address as these interlink to direct the preferred audience reading positions. Applying this multidiscursive framework to textual analysis provides an opportunity to see if the two regimes of facts and fiction sympathetically promote either of the two paradigms.

It is predicted that modern paradigm meanings will dominate. Significant representation of new paradigm meanings points to television texts as an important site for cultural expression and negotiation of the paradigm change in order to maintain the dominant hegemonic power attributed to science in society. In gaining social and cultural support for the new paradigm, there is no test that can be carried out. Ultimately a paradigm shift occurs as consensus grows and critical debate is subdued. For a scientific revolution to occur new paradigm meanings need to gain powerful acceptance and then enter the domain of popular thinking. Six contemporary texts have been chosen to broadly represent varying popular cultural expression of popular and specialist thinking of science.

These six different programs are structured into two different categorical regimes. These two regimes are: facts and fictions. This categorising helps to make the link between modes of address and modes of production with their underlying vision of reality. These six texts are chosen to represent a diversity of generic strategies employed by producers to variously address both adult and child audiences. These texts include the serious voices of academic science, institutional science and the diverse voices of popular science. They therefore represent a very powerful site for communicating both the status quo and the negotiation of change in the domain of science.

The facts regime includes the following television science texts:

1. Quantum. (1994 series). Australian Broadcasting Commission.
2. Beyond 2000. (1994 series). Ten Network Australia.

3. Totally Wild. (1995 series). Ten Network Australia.

The fiction regime includes the following television science texts:

4. Captain Planet and the Planeteers. (1991 series). A Dic Production for The Turner Corps.
5. The X-Files. (1994 series). Twentieth Century Fox Film Corps.
6. Skytrackers. (1995 series). The Australian Children's Television Foundation.

Examining the production formations of these texts identifies the industrial, and political agendas underpinning the modes of production and modes for interpellating audiences. Each of these textual formations is discussed to disclose the paradigmatic "imaginings" underpinning producers' formational concerns. The formational visions of reality imagined in a text by producers, impacts upon the modes of production, the modes of address and the "imaginings" of the text's audience. Analysis reveals the ways these societal structures link the producers with the preferred readings of a text.

The two different paradigm models frame different "imaginings". These imaginings articulate variously through the chosen modes of production and the modes of address specific generic strategies. A genre is a cultural paradigm set which producers employ with the understanding that it conveys for audience a set of orienting expectations. Genre conventions are ideological agents of closure, reflecting the institutionalisation of a paradigmatic framework to limit meanings and identify a text's preferred underlying vision of reality.

However the work of Adorno (1991, p. 29) points out that another important function of genre in popular culture lies in the organisation of pleasure: we might consider standardisation not only as an expression of rigidity but also as a source of pleasure . The components which generically structure the modes of production and modes of address cohere to not only articulate the kind of story to be told, but the way the text will tell its story, and also just who producers "imagine" they are speaking to.

Narrative strategies win support for the different ideological values of the two paradigms. Analysis of a narrative structure discloses a text's ideology. Texts, according to Kozloff (1992), have goals beyond entertainment such as description, education, or augumentation and employ narrative as a means to their ends. Science texts employ narrative strategies that mythologise the underlying paradigm ideologies of science. Kozloff (1992) states that in the medium of television "the strategy of proliferating storylines diffuses the viewer's interest in any one line of action and spreads interest over a larger field". Extending this idea, she says: "television stories generally displaces audience interest from the syntagmatic axis to the paradigmatic - that is, from the flow of events per se to the revelation and development of existents (p.75). The narrative of some of the

texts' structure primary focus on a paradigmatic discourse on science, while others focus on technology as outcome of science.

Textual analysis reveals the ways the rhetorical modes of a text construct the textual discourse. In order to examine the paradigmatic framing of the discourse, this thesis proposes a model linking the three part "scientific", "holistic", and "ecological" new paradigm model to a discourse analysis model. Applying three frameworks to discourse analysis enables the identification of ideology underpinning the scientific characteristics, the key holistic "post-Cartesian" principles, and ecological values that link to position the two the core structure of the paradigm frameworks. The purpose of this is to reveal the complex ways "meaning is woven into the fabric of cultural products" (Mcleod, Kosiski, & Pan, 1991).

The analysis enables discussion concerning the links that may exist between paradigmatic discourse and generic modes of production and rhetorical modes of address. Some strategies may be identified as holding greater sympathy with new paradigm models. Others may hold resistive power, maintaining the dominance of the modern paradigm vision of reality within the discursive fabric of culture.

It is beyond the scope of this project to move its focus beyond preferred readings of a text to directly engage with audience reading practices. However texts have been chosen that address a variety of audiences, both adult and child. Information about the audience share of these text provides a limited indication of their effectiveness in interpellating audiences. Addressing the different 'pleasures' audiences seek from texts, those modes of address included construct both regimes of fact and regimes of fiction. As the new paradigm informed model of communications is a non-linear diffusion model with noted feedback characteristics, analysing the formational context of texts, the modes of production and modes of address, articulates the various ways these interweave with audience imaginings and the preferred meanings.

This methodological model provides opportunity to respond to Slack and Whitt's (1992, p. 571) call for the field to not only describe, but also "*intervene* in one of the most pressing political, economic and cultural issues of the late twentieth century: the relationship between the human and other-than-human world". For as new paradigm models inform us, the new reality is that the two are complexly and chaotically intertwined. Science on TV provides a key site to engage with this debate.

PART 2

Chapter 5

5. Science on TV: Textual Analysis - Regimes of Facts.

5.1 Introduction

In response to Carey's (1989, p. 110) call for research focused on "mass media as a *site* on which to engage the the general question of social theory", this thesis analyses television science texts. Television as site offers opportunity to engage with producers' formational agendas, the text as discursive position and its audience interpellation strategies. The ways these three strands interrelate identifies the interconnected processes of meaning production. James Hay (1992) nominates these interrelated processes as including signifying, narrative, reading, economic, industrial, technological, political, ideological, and cultural processes. In addition he says:

> Television, then, is a historical and socially situated *site* were these processes converge, as well as a set of historical and socially situated *practices*, habits, and conventions for reproducing these processes. Thus two primary objectives of television criticism should be to understand how these multiple practices constitute "television" and to consider their relation to broader processes in which television is historically and socially caught up. (p. 355)

Television science links to the interrelated economic, industrial, institutional, technological, political, ideological, and cultural processes in society. Like the science from which it is sourced, 'serious' and 'factual' television science sits in a prestigious position in society. This high status positioning attributed to 'factual' representations of science confers to the text the same serious values as those attributed to the project of powerful institutional and academic science. Fictional regimes do not share in this status. With the production of pleasure underpinning fictional texts, science may be less dominant. Fictional texts' pursue pleasure for audience and profits for producers, In attempting to be popular fictional texts may include more heterogeneous discursive meanings.

Identifying the powerful cultural positioning afforded 'serious' television science, Bell and Boehringer (1989) say:

> The visibility of modern technology, the easy recruitment of 'medical miracle' stories (e.g. heart or bone marrow transplants), to 'human interest' genres, and the drama of high technology (e.g. space exploration) mean that science and technology is one of the most commonly represented areas of socially significant television. (p. 103)

As a key site for socially significant television the value of analysis is to show how large-scale issues, such as ideology and power, connect with small-scale processes within texts (Hartley, 1992, p. 75).

Discussing the interlinked relationship between a text's representational strategies and the process of ideology to frame meanings, Annette Kuhn (1991) says:

> In producing meanings, representations may in effect shape our understanding of the world we live in. This is a process of ideology, which in one of its several definitions, is understood precisely as a society's representation of itself in and for itself, and the ways in which people both live out and produce these representations. In a divided society, of course, ideologies can be heterogeneous and meaning contested - and indeed ideology is commonly associated with power or hegemony, which suggests that meaning is never neutral, but always caught up in relations of power. (p. 53)

Kuhn's insights highlight how heterogeneous ideologies can be dynamically interacting and competing to negotiate dominate meanings within texts. Applying the three part new paradigm methodological model: - the scientific framework; the holistic framework; and the ecological framework to analyse science television texts, enables this dual discursive meaning contestation to be identified and discussed.

Gardner and Young's (1981) work in Britain discusses the conventional representational strategies of science on television, and concludes that the ways in which science and technology are represented become central questions of society and culture. Conventionally the employment of dominant representational practices, positions science in a dominant techno-deterministic closed discourse on progress, with little opportunity for critical interrogation of this closed discursive framing. These strategies of closure delimit the signification of meaning and control the preferred reading outcomes of audiences.

Gardner and Young's (1981) work centres on texts positioned within those generic boundaries that construct narrative focus on 'serious' reporting: science "facts" presented with "neutral" or "value free" assumptions. Their findings critique the closed discursive framing of modern paradigm science. Working in a climate of rising participatory democratic concerns, Gardner and Young argue for the alteration of contemporary modes of representation for those who wish to change the structure of society. They call for the domain of science to be opened up in three ways:

> We advocate an approach that keeps all three themes in relation to each other: sources or constitution; labour processes or social relations or production; articulations or contextual relations. Our purpose in advocating a different approach to science on tv is to open up the process of origination of new facts, artifacts, or procedures to public scrutiny or debate. As things now stand, we are faced with them at the point of impact when they are so highly developed and/or capitalised that it is difficult to believe that real democratic process is possible. (p. 191)

Gardner and Young's work fundamentally questions who science media serves - the institutional structures from which its narratives are sourced, or audience concerns with both entertainment, information and inclusion in the participatory democratic processes of our society. Inclusion in the participatory democratic processes is strengthened by critical and open debate.

Both the Australian science and technology television texts, Quantum, Beyond 2000 and Totally Wild generically link back to those British texts, such as Horizon and Tomorrow's World, examined by Gardner and Young. These three texts employ strategies that position them as regimes of facts. With increasing consensus in the various disciplines of science for the revolutionary new paradigm since Gardner and Young's democratic concerns were expressed, do contemporary texts more democratically critically debate the strengths and limitation of the working of the two paradigm models of science? Or are their conventional rhetorical modes so saturated with the logic of the modern paradigm that they resist the communication of new paradigm meanings?

5. Science on TV: Textual Analysis - Regimes of Facts.

5.2 Quantum (1994). Executive Producer: Alison Leigh. The Science Unit, A.B.C.

Formations:- Modern or New Paradigm Imaginings?

The formations of Quantum are important for its central link to national public policy agendas. Quantum first went to air in 1983. The program is part of several public policy strategies to transform the Australian nation from one "imagined" as the passively endowed "lucky country", into a more pro-active "clever country". Barry Jones (1992) attributes the shift underpinning this national agenda to the change of Australia's 1960's fourth ranking per capita income, to twenty sixth by 1988. Framing this call for investment in science was the premise that a country actively engaged with science and technology, would be better placed for economic success in the highly competitive post-industrial global economy.

In summarising the economic impetus for increased support for science, Barry Jones (1992), as Chairman of the House of Representatives Standing Committee for long-term strategies, said:

> Australia illustrates the problem of a resource-rich and dispursed urban society, which traditionally relied on exporting high-bulk, low value-added commodities, has undervalued intellectual achievement, and is having difficulty making a transition to a scientifically and technologically mature economy. (p. 97)

This rhetoric underpins agendas to promote a progressive role for science media to engage an audience with science in order for Australia to become a "mature economy".

Jones (1992) claims Australians believe science is important, but have a vague and self-interested view for the most part of what science is. This articulates further the educational agenda for science media to clarify for Australian the importance of science and gain extra support. Explaining support for science he says:

> A recent survey by the magazine New Scientist (September 20th, 1989), found 55.7% thought science "did more good than harm". Enthusiasm was related to economic standing and gender. Men were more supportive of science, as were the richer and better educated. Asked about funding levels 61.5% supported more spending. The most recognised and supported fields were medical and environmental, followed by new energy forms...The data suggests there is widespread but "soft" support for science, especially where it could affect the respondent's direct well-being - health or environment. (p. 106)

These findings reflect the cultural resonances patriarchal modern capitalistic values to support for science. Predictably those who believe in science are significantly men of higher socio-economic standing; those who have the most economic and social power in patriarchal society; i.e. those who's needs modern paradigm based science serves most. Only 55.7% believed science did more good than harm. This figure reflects the growing disillusionment with science for its narrow

focussed criteria for defining and quantifying "growth", "progress", and "improvements". Emerging from this political formation it is possible to predict that the dominant values in Quantum are underpinned by a deterministic belief in science as progress.

Quantum is linked to this public policy agenda setting media support for science. The program is produced by the Australian Broadcasting Commission's science unit, which has a staff of 29 and a budget of $3 million to produce 22 hours of science a year. In 1993 the science unit produced Quantum (24 programs) and A Question of Survival (10 programs) (Gascoigne and Metcalf, 1993). A Question of Survival incorporates environmental issues into the science agenda. Separating environmental issues from mainstream science maintains a fragmented structure to the scientific knowledge discourses, and the marginal positioning of debate. This strategy articulates the perceived conflict between economic growth and environmental concerns.

The link between public policy understandings iterated above in the rhetoric of Jones and this text's public funding, suggests its formational agenda is to foreground the progressive ideology of the project of modern capitalism.

Modes of Production: Modern or New Paradigm Framings?

Quantum is a 'serious' half hour weekly magazine program shown at the prime viewing time of 8 p.m. mid-week and repeated at 1 p.m. later in the week. On a public broadcasting channel this time slot is conventionally occupied by programs with a strong information and pedagogic motivation. This time attracts a 'family' audience. As a 'serious' facts text it competes with family entertainment texts, such as sitcoms for a limited audience share.

Hartley (1992) describes audiences as not just constructs, but as invisible fictions that are produced institutionally in order for the various institutions to take charge of the mechanisms of their own survival. Elaborating further on this he says:

> Audiences may be imagined empirically, theoretically, or politically, but in all cases the product is a fiction that serves the need of the imagining institution. In no case is the audience 'real', or external to its discursive construction. There is no 'actual' audience that lies beyond its production as category, which is merely to say that audiences are only ever encountered *per se' as representations*. (p. 105)

The producers' pre-conceptions of Quantum's imagined audience are based on the concept of intelligent readers with motivated subject reading practices. Attracting an audience of about 700,000 (Gascoigne and Metcalf, 1993), the program does not attempt to attract a broad audience.

In discussing the characteristics of Quantum's audience, executive producer Alison Leigh says:

> For nearly a decade Quantum has aimed at an intelligent audience with "cutting edge" science news. It presents items in a social context rather than as simple "breakthrough" stories, and the program tries to show the process of science so

> that people are more aware of the limitations of the scientific method. (cited in Gascoigne and Metcalf, 1993)

This "intelligent and critical" rhetorical construct of imagined audience, underpinned by a strong information and education policy agenda, implies this audience to have some knowledge of new paradigm understandings.

The institutional sourcing of meanings, the strong formational agenda, and the producer's imagining of its audience, links to the chosen modes of production in Quantum. Drawing on the conventions of news, Quantum employs modes of production that 'naturalise' its authority through modes of address constructing a 'realistic' serious regime of facts. Strategies are used to legitimate and give serious weight to the voices represented. The dominant collective voice that speaks for science is that of the university academy. Attempts are made to link to schools though specific appeals which are often associated with The Australian National Museum and other public agencies. A textual link is made between the modes of production and the powerful institutional authorities of Australian society: government; educational institutions - both schools and universities; industry; and public broadcasting.

It is predictable that as well as the privileging of these powerful institutional voices, analysis will reveal "the importance of the cultural resonances in the privileging of some issues over others" (Hansen, 1991, p. 444). These formations implies that that closed discursive strategies are employed in order to support the construction of the preferred meanings of hegemonic science. Progressively the producer's imaginings of an "intelligent" audience demonstrate awareness of the text's role in meeting audience needs as well as institutional needs.

Modes of Address: Modern or New Paradigm Framings?

The name Quantum is sourced from a physics discourse. The popular use of the word to mean quantity interpellating an audience already familiar with science. As a 'factual' magazine program, it is structured to present four segments of 'news' from 'cutting edge' developments in science. Conventionally these separate stories are not linked and are fragmentedly contained within their approximate six minute time allocation. Special editions however do link stories. This closed time framework limits the opportunity to contextualise and critique a scientific development in the way the executive producer claims the text does.

The structural conventions of the text fall into the factual generic boundaries Hartley (1992) calls "regimes of truth". Regimes of truth are constructed with a fundamental belief in the possibility of the representation of value-free, or value neutral facts. He says the conventional strategies employed by "factual" genres, such as this closed temporal division of issues into separate parts, are used in order to contain meanings in constructing their discourse on truth. Regimes are conditions under which processes occur; the prevailing methods or systems of things;

the governing assumptions. Among the regimes of representation, performance and classification, a regime of "truth" is used to keep order within the media. Keeping order within the media is synonymous with the maintenance of the status quo. Conventional regimes of truth signify the preferred meaning as "truth" in support of modern paradigm thinking.

Expanding further on the two different discursive regimes of truth - fact and fiction, Hartley (1992) says:

> Strenuous efforts are made, within each medium where both are found, to keep them apart. Factual and fictional truths are produced and circulated on the same channel, but by different professions, different companies or units, by different practices, in different genres with different semiotics systems and rhetorical conventions, invoking different codes of recognition and different modes of reading for different audiences, at different times of the day...Not only do different kinds of truth result from this process, but they are maintained in an uneasy hierarchy too. A rank order is imposed in which fact is more important than fiction; the 'real' is more true than the imagined. (p. 46)

Quantum, with its structural conventions related to the conventions of news, and motivated by the presentation of developments from science in the 'real' world, is positioned high in the hierarchical facts category. It employs specific strategies to construct a 'true' image of the scientific community, and its practices and achievements. Such convention are underpinned by the presumptuous belief that in applying these modes of representation, the issues are presented truthfully. Other formational agendas are swamped by this dominant modern discursive framing. This hierarchical positioning of truth identifies a key fundamental preoccupation of the modern paradigm.

Like news, this magazine structured program creates its verisimilitude within its stories by mixing diegetic actuality in the direct mode of address of reporters and scientists, and in documentary location style footage. This is augmented with non-diegetic modes of voice-over commentary, computer models and simulations, animations, graphics and music. These signify verification of meanings. The on location shots add authenticity to a report even though the voice-over is added back in the studio. These strategies link to naturalise a dominant ideology of modern paradigm science. As information television these strategies are claimed by producers to facilitate for the imagined audience a demystification of science, its setting, and the work of the scientist.

Female anchor, Kelly, links the separate items and acts as a mediator between science and the audience. Her role, like that of the news anchor represents "trustworthiness", which by implication is transferred to the program. This strategy signifies the ideological link between the construction of realism, truth, and trustworthiness to be associated with the outcomes of science.

The use of direct address and eye contact, by Kelly and her reporters is one of the semiotic devices which Hartley (1992) says is used to set the 'real' apart from the fictional. Kelly and the

reporters adopt the role of participant narrators to tie all the threads of a story together and to provide the viewer with the completed and conventionally closed narrative. Science specialists interviewed hold Ph.D.s and are attached to Australian universities. The result is the imagined community of Australian science is represented as being located specifically in universities. This articulates the link between institutional sponsorship and textual meanings.

Those scientists given direct address, commonly speak in white coats, while located in laboratories. This visually reinforces the mythology of the reductive, mechanistic and experimental modern paradigm model. It suggests that science researchers are reticent to go beyond laboratory walls where the variables are more complex, harder to identify, measure and control. These strategies and points of view interweave to suggest this text's discourse will be swamped with dominant modern paradigm meanings.

Opening Sequence: Paradigmatic Framings?

The opening and title sequence is very short and contains seven quickly cut shots that evolve through different representations of the word Quantum. In the first frame the word is cast in ochre sand. This cuts abruptly to the letters forming a white disconnected maze on a white background with red lines gridding across it. A white mouse runs through the letter "U". This cuts to a stencil of the word in blue. Through the letters ribbons of light waves move to light the background. In the next frame the title is stencilled in beach sand, signified by a shell and dried seaweed. A wave of clear water washes the word away and the shot cuts to a clear perspex representation of the word inter-filled with computer circuitry. The camera passes upwards above the text to a black space with stars. There is flash of light in the form of a prismic coloured beam. The final shot sees the perspex letter fall into line, moving from left to right.

These images signify the various conventional arenas: the natural world; the laboratory; technology; and the heavens; where science makes sense for us. The cutting from one scientific field to another reinforces the characteristic modern paradigm's fragmenting strategy to dissect the knowledge discourses within science. Blurred or dissolving editing signifies alternative new paradigm meanings of interconnectivity emphasising the spaces between discourses. This technique signifies acknowledgment of new paradigm meanings articulated by the discursive synergy connecting disciplines within the academy.

The music that underscores these images is dramatic and strong, with the power of science conveyed through the deep resonating sounds of a masculine chorus. This choral chant identifies a musical celebration encoding links between the historical spiritual shift from the dominance of patriarchal Judaic/Christian religion to that of atheistic materialism of modern science. The opening sequence is stylized visually and musically as a high aesthetic ode, exalting science, its

methodology, and technology. This cultural framing links to the conventional cultural resonances of the modern paradigm.

In discussing the relevance of a single text's contribution to a wide cultural agenda, analysis reveals the discursive mobilisations articulated through the rhetoric and narrative framing of a specific episode. Through analysis of a single program links can be made to a large-scale policy project. Seven individual programs taken from the 1994 season are studied. Of these three were focused on a single topic:- genetic engineering; the space shuttle launch; and cold fusion. Both a single conventional format and the special edition on genetic engineering are analysed separately because they employ different modes of address. The narratives reveal their subject framing.

TABLE:1 Narrative Focus and Framing of Quantum

Narrative Subjects

1.1. Kangaroo farming. **(environmental)**
1.2. Navigational technology.
1.3. Blood clot diagnosis. **(medical)**
1.4. Robotic development.

2. Special Edition: "The New Genesis".
2.1. G.E. growth hormones. **(medical)**
2.2. G.E. agricultural developments: plants. **(environmental)**
2.3. G.E. agricultural developments: animal. **(environmental)**
2.4. Gene therapy. **(medical)**

3. Special Edition - Recent Space Shuttle Launch.

4.1. Podiatry/Orthopedic diagnosis. **(para-medical)**
4.2. Speech and neuo-science. **(medical)**
4.3. Colloid developments.
4.4. Fish palaentology.

5. Special Edition - Cold Fusion Transnational Project.

6.1. Award winning forestry ecologist. **(environmental)**
6.2. Car emission: fuel efficiency technology.
6.3. Breast Cancer: radiology diagnosis. **(medical)**
6.4. Amateur paleontologist in New Zealand.

7.1. Diets: clinical psych; nutrition; and bio-chem. **(medical)**
7.2. Earth quakes; radio waves diagnosis. **(environmental)**

7.3. Archeological Paleontology - birds/dinosaurs flight?

The conventional programs, such as episode 1, 4, 6, and 7, illustrate the fragmented discursive framing of the narratives within the half an hour 'pot-pourri' of celebrated breakthroughs. The predominance of medical stories illustrates the hierarchical positioning of some scientific disciplines. This connects to the powerful social and institutional positioning held by the medical discourse in society. A significant number of stories fit environmental framing to narrative concern. This implies the rising importance of biological and ecological sciences within the academy, and also potentially represents opportunity to convey new paradigm meanings.

Scientific Framework: Modern or New Paradigm characteristics?

Does Quantum present narratives underpinned by modern or new paradigm scientific characteristics? Applying Capra's framework for identifying the key scientific characteristics to trace the paradigm shift to analyse the narratives and representational strategies employed to foreground science in the first item in Episode 1 enables positioning of its science discourse.

Item 1.1.

This item promotes the scientific rationale for supporting kangaroo farming for human consumption. While this story concentrates on reductively measuring the success of kangaroo farming as alternative strategic part to economic agricultural practice, the logic of the scientific argument is essentially ecological.

Locating science in the 'real' world beyond the laboratory, the casual style of the rhetorical arguments is visually supported by stereotypical visual images of the Aussie rural lifestyle. The images and rhetoric moves through the landscape, with the female journalist speaking with the university expert and a technician observing in the field. In an informal style, they explain the measurement techniques for estimating the carrying capacity of the land; the impact that different species such as sheep, cattle and kangaroos have on the ecology; and the sustainability of such practices. This narrative strategy uses new paradigm scientific models for its examination of kangaroo farming positioned contextually in this 'real' ecological systemic environment.

Applying Capra's second scientific characteristic component for tracing the paradigm shift from modern to new as moving from structure to process, the narrative is also progressive. In focusing on the ecological context for kangaroo farming, the explanation emphasises the interconnecting process such as water availability, the vegetation needs of the different animals, and the impact of their "soft" or "hard" footedness upon the vegetation and therefore the ecological health of the location. This emphasis identifies the concept of sustainability as being process oriented for the maintenance of environmental health.

Capra's third key scientific characteristic for tracing the paradigm shift is moving from objective science to epistemic science. The narrative does not attempt to hide its cultural subjectivities in the ways the rural lifestyle is mythologised and romanticised. Technology employed to quantify results is promoted for its practical utilitarian value, not its preciseness. The "akkubra" crowned professor is represented walking through the landscape discussing the subjective observations of the health of the landscape with a national park ranger. The audience overhears their conversation. The journalist later joins the professor for a barbecue of kangaroo steak to subjectively judge the merits of the meat as food and cultural experience. This declared subjectivity acknowledges complexity and discusses the issues as more about epistemic science than objective science.

Capra's fourth scientific characteristic component is moving from building to network as metaphor for knowledge. This narrative's scientific argument highlights the interlinking of ecological and economic factors structuring the knowledge outcome as a network.

Finally Capra's fifth scientific characteristic component is moving from truth to approximate description. Strategies emphasise the emotive subjectivities framing the narrative strategy. While the merits of kangaroo farming is structured as a 'truth', it is argued on the logic of ecological and therefore economic sustainability. The verifying methodology is represented by foregrounding utilitarian, appropriate, but not necessarily precise measurements. This presents valid information as approximate descriptions. This less precise quantifying strategy is underpinned by recognition that holistic ecological systems are so complex that knowledge is best understood as approximate descriptions.

The new paradigm underpinnings of this item's key scientific characteristic components results from its ecological discursive framework which articulates to economic and cultural discourse. This multidiscursive engagement suggests this story will also promote new paradigm holistic principles.

Holistic Framework: Modern or New Paradigm Principles?

Henderson's (1991) holistic framework is used to identify textual representation of new paradigm principles. This story focus on its real world context and discussion of the issues as complex and interconnected. The historical narrative framing critically emphasises the ways Eurocentric agricultural practices contribute to the deteriorating landscape.

The rhetorical and visual images highlight the interconnecting distribution and redistribution of effects as cause of unsustainability. This logic constructs the environment as a holistic system. The merits of kangaroo farming is promoted through the linked processes of history, ecology, economics and culture. This underpins Henderson's new paradigm principle of

heterarchy, where the emphasis is on complex mutuality of cause and effect; co-operation and competition. Environmental health is framed as dependent on heterarchical processes of co-operation. Kangaroo farming's ecological rationale is constructed as meta-logic; a "win-win" underscoring the new paradigm principle of complimentarity.

Regressively the "then" and "now" framing constructs a binary "them" and "us" to the logic emphasising the progressive nature of time rather than critically highlighting the ongoing disaster of Eurocentric dominant agricultural practice in this ecological system. This falls back into the dichotomous logics of modernist principles and practices. Within the discursive framing, science is promoted as the tool to articulate this complex problem. This practice of privileging voices within the dominant scientific discourse does not address how specialist aboriginal ecological knowledge has understood this research finding for thousands of years.

With its ecological emphasis the narrative refers to the biological organising, self-referential nature of kangaroo farming as systemic. This underpins the new paradigm principle of uncertainty. This debate focuses on an evolutionary view of change as fundamental. With this textual strategy framed in ecology discourse, what are the ecological ethics underpinning the argument?

Ecological Framework: Modern or New Paradigm Values?

Merchant's (1992) ecological framework nominating egocentric, homocentric, and ecocentric shifting values, is applied to the values represented. The narrative framing is grounded in utilitarian anthropocentric values. Kelly introduces the story by saying: "kangaroos will become the saviours of the bush". The bush is to be saved by kangaroos serving human needs. Underpinning this are homocentric values. The argument for the sustainability of kangaroo farming is weighted by human economic and cultural lifestyle needs. Ultimately kangaroo farming allows the maintenance of the cultural practice of red meat eaten at an Aussie bush barbecue. Sustainability values are framed around the desired outcome of maintaining a resource with more ecological responsibility for human needs.

Conclusions.

Despite the limited narrative time, there is a marked engagement with the ideology of the new paradigm, with some limitations noted in its underpinning ecological values. Examples of strategies that mobilise the predominant new paradigm meanings are identified in the locating of science beyond the laboratory, and through the use of subjective and emotive approaches to the story. Articulating subjectivities within the narrative suggests a link exists between this rhetorical mode and the promotion of new paradigm meanings.

Item 1.2

This story concerns the development by the Australian navy of new computer navigational technology called ECDIS (electronic chart display and informations system). The rhetoric emphasises it is in the developmental phase. The narrative reframes an environmental purpose to the navy's late twentieth century role in 'keeping our world safe'. Historical and environmental framing is used to link this story to the previous one. The purpose of this linking is to transfer progressiveness from one item to the next making the story seem more progressive than it actually is.

Images of attractive sailboat clippers in Sydney harbour set the scene. The journalist in voice over mode says: "today the seas are less perilous for ships, but ships are more dangerous for the seas." This articulates history as progress. With that progress enabled by the development of military sourced technology, disasters are relocated to history and the future looks safer for the world because of Australian technology. The possibility of Australia becoming a leading navigational technology nation is linked to this technology. The on location reporter controls the rhetoric, being the only one addressing the audience. The images support his rhetoric to didactically direct preferred readings. This linear narrative pathway deterministically links this emergent technology with 'progressive' economic and international power.

Textual promotion of technology renders invisible the paradigmatic underpinning to the science. The audience is invited to engage with the technology at a late stage of its development. This convention continues the dominant tradition within factual science texts to present closed scientific developments to audience.

Ecological Framework: Modern or New Paradigm Values?

In using environmental framing, ecological values are promoted. The historic rhetoric shifts to news footage of real contemporary environmental shipping disasters. Explaining the proposed development path of the technology the journalist hypothesizes that the intention behind this technology is for Australia to become a leading nation in navigational technology, resulting in environmental shipping disasters becoming a thing of the past. The environmental framing represented in the rhetorical shift from "the seas being dangerous to shipping", to "shipping being dangerous to the seas", articulates Merchant's shift from homocentric ecological values to more ecocentric values. The discourse recognises the contributing factor of human error to environmental disaster. The technology's utilitarian value is framed in preventing environmental disasters and making those people responsible more accountable. The link is made between ecocentric values and leading nation status. This represents significant cultural reframing. Underpinning this is the idea of reconnecting human fortunes in partnership to that of nature.

Item 1.3.

The third item moves to a medical breakthrough in the management of blood clots. The reporter takes the audience through the various participants in the discovery narrative structured as a collaborative 'detective drama':- the doctor; the hospital; the patients; the nuclear research institution; the laboratory, with white-coated female assistant and mouse; radiographers; and the specialist in nuclear medicine. The narrative retraces, in a linear deterministic pathway, the various contributory developmental stages of this medical "life saving" breakthrough. The text informs this research has taken five years. While this notes the complex nature of building new scientific knowledge, it also justifies the large amounts of money invested in research.

The narrator states the research will be readily available after three years and $50 million of development in partnership with a United States Company. Serving the formational agenda of the text, the story concludes that this Australian development will save lives all over the world. Rhetorically medical science is constructed as the victor in a binary battle against the dark side of nature, and as a result economic success. The female journalist dominates the narrative through direct address and voice over techniques. Only a specialist doctor is allowed to address the audience with explanations. The patients are constructed as fearful voiceless victims.

Scientific Framework: Modern or New Paradigm Characteristics?

The first of Capra's key scientific characteristics components identifies the modern paradigm underpinning to reductive focus on a problematic part of the body: blood clots, more specifically deep vein thrombosis. As in the previous story, with a narrative development heralded as more accurate diagnostic technology there is little opportunity to analysis or critique the science framing or developmental path that led to this outcome. This drama represents a closed scientific detective story.

This narrative closure is supported by the attention grabbing strategy of the story unfolding as drama. This strategy illustrates Kosloff's (1992) idea that television stories generally displace audience interest from the syntagmatic axis to the paradigmatic axis moving from the flow of events to the revelation and development of existents. In television it is the characters and their interrelationships that dominate. The drama is further constructed by camera point of view positioned near the floor while moving along hospital corridors; 'spooky' music; and dark blue lighting framing empty beds in hospital wards. These devices close off critical readings, directing them to the preferred meanings of celebrating with unquestioning awe medical science's 'gee whiz' technology. The strategy of using drama drawn from fictional modes aims to add to the item's value as entertainment. Despite modern paradigm ideology does it represent Henderson's (1991) new paradigm holistic principles?

Holistic Framework: Modern or New Paradigm Principles

Henderson's first holistic new paradigm principle is interconnectedness. While reductively focusing on blood, the early didactic address given by reporter James does discuss the interconnecting positive and negative attributes of blood for human health. The dramatic story of the development of the diagnostic technology pays tribute to the combined interconnected team skills. This stresses a holistic industrial role in the formation of the technology. In terms of the new paradigm holistic principle of heterarchy, the chosen modes of address reinforce the dominant hierarchical industrial power structure in which the specialist doctor is afforded dominance in presiding over health issues.

Blood clots are not described 'mechanical' malfunctions. In outlining both the positive and negative attributes to blood with positive and negative health outcomes, Henderson's second holistic principle of redistribution is articulated. Health is constructed as a balance. Similarly the new paradigm holistic principle of change is only signified as positive when linked to the concepts of mastering the situation through technology. Change in this context is linked to a progressive technology discourse. Technology has the power to make change for the better and overcome the possibly of death. This very limited holistic understanding implies this story contains few ecological values.

Ecological Framework: Modern or New Paradigm Values?

Mythically a binary argument frames medical science's attempts to overcome the dark and life threatening qualities of nature. The story celebrates medical science's capacity to remove the unpredictable aspect of the dark side of nature. Much capital and resources, including nuclear technology, are justified in the pursuit of this. This story is essentially constructed around Merchant's category of egocentric values. Framed around a closed modern paradigm bio-medic model, this item focuses medical research as concerned mainly with illness, ultimately celebrating medical science and technology's capacity to 'master' nature.

Item 1.4

Graphics of the word technology and a green light running through it introduce the final story, - in this case "Mr Plod" the walking robot. It is another naval development to enable the simplification of ship welding. The segment opens with a black and white clip taken from the 1960's television series Lost in Space. This footage interpellates an audience with 1960's subjectivities in media and robotics. Again a progressive historical framing celebrates the little contextualised and commented on miracle of contemporary technological developments. This item is framed by linear utilitarian and deterministic values. Underlying its "newsworthiness" as a development to facilitate welding in the ship building industry, is an agenda to link science, the Federally funded CSIRO, the military, and progressive technological and economic outcomes for the nation.

Conclusions.

Three of the four narratives are constructed on a binary argument between disruptive historical disasters and positivistic scientific solutions. These narratives emphasise solutions argued on dominant modern paradigm based values and practices. The emphasis in narrative is on closure. The simplified narrative framing points to the dominance of dichotomous arguments reinforcing linear structured reductive modern paradigm principles. This dichotomous, binary structuring of argument is a discursive device which is mobilised to frame contemporary "scientists as the primary arbitrators of right or wrong, true of false, real and imagined" (Hansen, 1991, p. 452). This links to the strong textual formational agenda of promoting science. Ultimately this serves to reinforce the hegemonic position given to science.

Despite the text's dominant inclusion of the cultural values of the modern paradigm there is noted new paradigm values represented in the first item. This is derived from its ecological disciplinary sourcing. Linking this with the rhetorical and respresentational strategies promotes preferred readings towards new paradigm meanings.

Bell and Boehringer (1989, p. 107) criticise Quantum because "its rhetoric focuses on technology overcoming impediments (duration and range of alternative machines) in the development of an unquestioned *advance* (one that 'you' are assumed to be keen on and capable of sharing). These criticism are still appropriate for this contemporary example of the program.

In previewing the next week's program - a special edition focused on genetic engineering, Kelly asks "how soon will we have to make decisions about changing our own genetic future, and how far should we really go?" Kelly's question signals to the audience that the next episode engages with an intelligent, ongoing, and open ended debate. This strategy articulates to the agenda setting formation and producer's claims of actively engaging its audience with the concerns of science. These non-conventional strategies serve to interpellate the 'imagined' audience differently.

2, Quantum "The New Genesis": Modern or New Paradigm Modes of Address?

This episode breaks conventions with a reduced opening. The word Quantum appears in perspex evolving to a picture of the jellyfish swimming and then cuts to Kelly, who introduces the topic. The "New Genesis" title dramatically appears some minutes into the program. This episode breaks with the conventional limited time framework. While maintaining four separate stories, each links to the theme of the program - genetic engineering. The linking strategy constructed through Kelly's dominant anchoring and reporting structures greater narrative flow when compared with the previous fragmented episode. The narratives of the four "news" items concern developments in:

2.1 medical technology - genetic engineered human growth hormone.
2.2 developments in plant bio-technology.
2.3 developments in animal transgenic technology.
2.4 radical gene therapy - the mapping human genes project.

Kelly's role as heterodiegetic narrator is significant. In introducing, reporting and interrogating the issues, she binds the whole project and controls it as a more holistic project.

Kelly states the program examines the complex ethics of this rapidly developing area of science and technology. She claims to interrogate the ethics underpining this, and simultaneously heralds them with positivistic awe and wonder. The nomination of ethics as the framework for the 'debate' implies potential for more complex new paradigm meanings. The text strategies address Bell and Boehringer's (1989) call for science television to engage with the human political context. This more open strategy structures greater potential for the representation of new paradigm science, and new paradigm ideology.

It is relevant to note that engineering has been the axiomatic discipline for applying the technology of modernist science. For two hundred years engineering has concerned a science based on quantitative and reductive approaches to 'structures', and the 'mastery of nature'. "The New Genesis" title likens the field of genetic engineering as having the power of a contemporary deity invested with the new power of creation. The god-like power invested in these scientists highlights the urgent need for wider societal engagement to debate the ethical political implications. The rhetoric calls the audience to engage with these debates that are too significant and complex to be left to scientists a one. This representational strategy contextualises science in society.

In opening this debate, voice over mode is used by different male experts to articulate the supportive, critical, and cautionary points of view: "It has promise for better food and medicine"; "There are questions about power and control in our society"; "We are just tinkering around on the periphery"; "It is brave new world technology." This rhetoric feeds to wider societal concern of the ethics of genetic engineering, instead of the conventional celebration of the utilitarian values of scientific breakthroughs.

Scientific Framework: Modern or New Paradigm Characteristics?

In introducing the program Kelly says:

> Scarcely a week goes by without the news of the latest development in the field of genetic engineering, but genetic engineering presents us with an ethical minefield. It has the potential for feeding the world, for saving lives. But if scientists can change the genes of plants and animals, they can change people! Is this a future we should welcome and when should we draw the line? Our curiosity has taken us to the moon and beyond. Looking outwards we have started to

> understand how the universe was formed. Now with our sights turned inward to a whole new world, because inside the living cell is the key to life itself - DNA - the molecular instruction to allow life to go on, define us and every other life form on earth. Now we are learning how to manipulate it, making creatures that would never occur in nature.

Supporting this rhetoric the images shift macro representations to micro representations: footage of the moon landing, to the earth from the moon, to close focus of an astronauts helmet, to a close up of the eye, to an individual cell, and finally to the complexity of a DNA model.

This celebrates the historic achievement of space science in the moon landing, but focuses on the new contemporary micro 'frontier' with concerns about the nature of living cells and the key to life itself - DNA. In an alarmist tone, the rhetoric questions the myopic nature of this science research with its reductive focus and progressive assumptions. The dangers of the developments of genetic engineering are described as an "ethical minefield".

The narrative highlights that the scientist's attention is directed to a micro part of reality that has macro implications for the whole of reality. This framing draws alarmist attention to the wider political and ethical issues beyond the dominant narrow focus of science. The more open debate allows new paradigm rhetorical arguments.

The first breakthrough story is medical. It is an emotive, celebratory story of a girl treated with genetically engineered human growth hormone to overcome Turner syndrome. Conventionally the voices of reporters and academic researchers dominate but unconventionally, the victim is allowed to speak. She is however reduced to symptoms. The science is reductively focused on illness as a part of body malfunction. The implications of this illness is culturally reduced to the inconvenience of shopping for clothes.

The story concludes that through genetic engineering she is able to live a normal life and go shopping. The values of modernist capitalism are interwoven into the narrative. A simple narrative celebrates science's capacity to restore health. Illness is constructed as an inconvenient life style issue. The narrative strategy is a positive closed 'gee whizz' one. The causes, treatment, or solution are not given wider socio-political contextualisation. The disastrous outcomes of the earlier treatment using the pituitary glands of dead bodies is quickly brushed over. In the field of medical science, genetic engineering is constructed as unquestionable modernist progress.

Using Capra's second key scientific characteristic component to trace the paradigm shift as moving from structure to process, the illness is framed as a modern paradigm underpinned structural problem. The human body is only discussed in a narrow context - growth. The closed story hardly inform, or interpellates that "intelligent" audience. In glossing over the scientific component characteristics, the narrative represents dominant modern paradigm practice. In terms of Capra's fifth key scientific characteristic component for tracing the paradigm shift as moving from truth to

approximate descriptions, this outcome of the removal of the girl's symptoms is constructed as closed outcome - a truth. The possibility of side effects is ignored. This first story fails to do what the introduction claimed the text would do - to critically engage with the wider ethical implications of this research.

Kelly then outlines 'advances' in trans-genetics in food production to improve yield, flavour, and disease resistance - all characteristics which make them desirable commodities. She examples a case study of research undertaken by the CSIRO to prevent "leaf roll" virus in potatoes, a disease which dramatically reduces yield for producers. The narrative explains that the researchers have introduced genes from the virus into potato cells, and are now at the cultivation stage of the experiment. These transgenic potatoes appear to resist the disease. The reporter warns that while this appears to work, scientists really don't know how the process works. "We just have to keep investigating the mechanism", says one of research scientist.

The rhetoric again emphasises the reductive approach to research framed on understanding micro reality, however directs cautionary criticism towards the limitations of this approach. Kelly says viruses change, that the spread of the disease is interconnected to the movement of aphids, which results in farmers spraying at least six times a year. Defensively research scientists argue that this development reduces the disastrous environmental impact of spraying. Other voices highlight the need for the reductive research to be critically examined on more holistic lines. These various voices allow shifting points of view to mobilise debate over answers. This strategy draws critical caution to the dominant modern paradigm framing that structures institutional and organisational research, knowledge and funding. The arguments call for holistic research acknowledging the new paradigm underpinnings to the nature of reality. The weight given to this new paradigm line of argument reflects the accommodating nature of hegemony to maintain the dominant position for science for arbitrating over problems in society.

Both sides of the paradigm argument are represented and the more open strategies allow the audience to position themselves in the debate. Mobilising Capra's fifth key scientific characteristic component for tracing the paradigm shift as moving from truth to approximate description, both paradigm informed scientists highlight the uncertainty underscoring their research findings. Knowledge is constructed as approximate descriptions.

The third item concerns debates around transgenic engineering of animals in the quest for enhanced food production The narrative examples the disastrous outcomes of genetic engineering research underpinned by narrow modern paradigm framing. Alarmist rhetoric and disturbing images of experiments alert to overseas disasters. A tragedy with transgenic pigs is linked to potential disasters in local transgenic programs. This identifies the lack of institutional structures and legislative procedures to prevent this, and calls for ethical accountability to underline

research. The debate shifts the ethical responsibility from the scientist to the wider societal and governance structures.

The cautionary, critical and ethical framing strategies have more potential to interpellate the imagined 'intelligent' audience. These strategies acknowledge the important role for science media to critically contextualise science research in the wider socio-political arena. This links to promote empowered active reading positions. This cautionary interrogation strategy links to the formational agenda of engaging an intelligent audience with cutting-edge science.

Finally the narrative moves from transgenic animals' projects to explore the human applications of research into mapping human genes in medical science. Despite the cautionary rhetoric of the previous two stories, Kelly's rhetorical point of view shifts again to one of awe with developments in the highly emotive area of children's medicine. In a closed narrative she outlines the "enormous" potential for radical gene therapy in treating disease and relieving "suffering".

Underscoring the progressive assumptions promoted by medical scientist, the tremendous gaps in understanding the implicit complexities is noted. Imagery shifts from the technological machinery of gene mapping to emotive footage of crying and smiling children inflicted with life threatening genetic diseases in hospital contexts. A white coated doctor emotively argues that the ability to save a life is important beyond all other questions. The doctors' paternalistic, and hierarchical social position as ultimate arbitrator in these matters is highlighted.

When the site of research moves to the medical area, the debate is closed to foreground the wonderous achievements of medical research scientists and doctors. This reticence to criticise the medical profession shows the dominant institutional power afforded to this specialist disciplinary field. In terms of new paradigm science, and in terms of the wider open ethical debate at hand, the naturalisaton of this power overwhelms critical engagement with the merits of scientific research.

The preferred meanings of the modern paradigm dominate the stories about medical science. However the more open strategies used in discussing the ethics of agricultural research identifies new paradigm caution, and critical warnings to the short comings of the reductive focus of the genetic engineering scientific research. When material is sourced from ecological disciplines such as ecology, the scientific characteristics are more in sympathy with the new paradigm.

Medical science stories however reflect the scientific characteristics of the entrenched modern paradigm ideology and endorse dominant power afforded to medical institutions. This episode shows the ways ideology can be heterogeneously represented in texts, and can variously shift to dominate meanings within a text.

Ecological framework - modern or new paradigm values?

The ethical framing opens the text to a more democratic approach to voice multiple points of view. Hover there is limited inclusion of ecological ethical points of view. The dominant values are homocentric. While principles of interconnectedness, heterarchy, change and uncertainty were discussed in reference to the environmental complexities of the plant transgenic project, the ecological understanding of the nature of reality is framed by homocentric values.

This is affirmed by the conventional positioning of humankind outside of nature. Both the plant and animal transgenesis stories affirm and naturalise human's domination of nature. Environmental sustainability arguments are underpinned by economic arguments to fulfil the dominance of human, often first world peoples', needs. The debate promotes lifestyle choices for humans. The "gene-nome" project is underpinned by the belief that that total gene pool represents a rich utilitarian repository that needs decoding to meet humankind's ever increasing needs.

Both the medical stories promote egocentric values. They promote medical developments to reinforce the powerful dominant capitalistic and institutional values held by the medical profession. The medical point of view resonates powerfully its modern paradigm ideology. New paradigm ideology only surfaces in the agricultural stories. In conclusion Kelly directly addresses the camera in a close up shot. She speaks to scientists, critics, industrialists who have all been represented. As a last open cautionary strategy, she warns the audience with the inclusive rhetoric: "we will all have to face these daunting questions".

Conclusions:

The alternative rhetorical modes used in this special partially fulfil the agenda to critically debate a rapidly growing in research field. This episode meets more than usual both the needs of science institutions and its audience. Engaging voices from various different disciplines enables the construction of different points of view from within science. Framing the program as an ethical debate extends the discourse beyond the domains of science into a socio-political context. These strategies significantly contribute to its open structure. Both the ideology of the modern and the new paradigm are included. This enables the heterogeneous representation of both wonder and critical caution to the achievements of a research field of science positioned in a wider socio-political context.

The dominance of modernist ideology in medical stories reflects the cultural power invested in the maintenance of dominant modern paradigm framing of the medical profession. The limited representation of ecological values reflects the limited way this text engages with the preferred organic, holistic and ecological meanings of organic, holistic and ecological perspectives informing meanings. Despite this failing this particular episode addresses in some ways the formational objective of interpellating an intelligent audience as part of a wider public policy concerning the construction of a "clever country" actively engaged with the issues of science. The use of

unconventional strategies links commonality with those new paradigm strategies suggested by Henderson (1991): many models, viewpoints, compromise, humility, openness, evolutions and learning societies.

5. Science on TV:Textual Analysis - Regimes of Facts.

5.3. Beyond 2000. (1994). Executive Producer: John Hoskin. Beyond 2000 Pty. Ltd.

Modes of Production: Modern or New Paradigm Framings?

Discussing science media in Australia, Gascoigne and Metcalf (1993, p. 18) say: "Beyond 2000 compliments Quantum. While Quantum looks at research still on the laboratory bench, Beyond 2000 concentrates on the results of applied research and the latest technology." Do their shared formational and generic origins link to promote congruent ideology of science and its technology?

Like Quantum, Beyond 2000 traces back to the publicly funded Towards 2000. After Towards 2000 ceased production, the three original reporters: Finlay, Arhill-Guiness, and Travers, formed and marketed Beyond 2000 Ltd. with the Seven Network. The text changed from the half hour to an hour. Three years ago the program moved from the Seven to the Ten Network. In its eleventh year of production, it claims a record as the world's most widely travelled and widely distributed television series sold in a staggering 90 world markets; the text has been dubbed into 10 languages - from Flemish Belgian to Portuguese and Russian. It is shown in countries as diverse as Puerto Rico, Bophusthatwana, Papua New Guinea, and Lebanon, and has been awarded prizes around the world. (Casellas, 1994) Locally it shares a similar market size as Quantum. (Gascoigne and Metcalf, 1993)

This global market presents opportunity to engage with those areas of science and technology that address issues of global concern. For many writers (Ferguson, 1992, Houston, 1993, and Roszak, 1993) the concept of globalisation draws into focus concerns around the environment, economics, politics, culture and technology. Discussing the impact of the globalisation of issues Ferguson says:

> More holistically and in terms of process, our incorporation into a one-world, global society is contingent on changing value orientations that propel us towards the whole earth as the physical environment, everyone living as world citizen, consumers and producers with a common interest in collective action to solve global problems. (Ferguson, 1992, p.70, citing Albrown, 1990)

This point of view links with the holism of the new paradigm vision of reality. This 'futuristic' text represent opportunity to promote new paradigm informed science and technology. The text also represents opportunity to actively engage the audience as critical consumers in evaluating these developments. Or does it simply provide 'gee whizz' opportunity for industry to sell its already developed products to a potential global market?

Moving the text from public funding to commercial funding changes its industrial underpinnings and this reverberates in its ideology. In publicly funded productions informational

agendas dominate. A commercial text favours entertainment strategies to sell information, and to provide audiences for advertisers. This impacts upon narrative content. Marketing to a 'global' audience with different subjectivities on science and technology, also impacts upon content. Quantum's public formation links to the national "clever country" policy agenda. Beyond 2000 moves beyond this to promote the image of Australia as a first world nation progressively engaged with science and technology to a global audience.

The program gives opportunity for the Ten Network to fulfil its statutory Australian production requirements and to position itself as providing public service information alongside its news and current affairs programs. Significantly, unlike the dominant focus on 'bad news' stories within the convention of news, Beyond 2000, like Quantum, predominantly constructs 'good news' stories. This reinforces science and technology as the dominant societal arbitrators of solutions and of 'progress'.

The Toyota Company is the major sponsor. This links with the stories coming from Japan. Many of these are advertising lifestyle gadgets. Technology is presented as commodities and this naturalises the capitalistic ideology underpinning the three components of the text, advertisements and sponsors. The advertisements shown during its weekday 7.30 pm screening and Sunday afternoon repeats reflect the diversity of its imagined audience demographics. These promote consumption through improved domestic and industrial lifestyle choices for individuals and corporations.

Beyond 2000 Ltd. produces glossy annual publications containing the 'big' stories and are promoted in local and school libraries. There are regular Beyond 2000 facts "spot" reports on major national F.M. radio stations. These link a topical news event of a dramatic nature, such as an earthquake to informative 'factual' perspectives drawn from an explanatory science discourse. These marketing strategies, like the television text, have a two fold function: to interest and inform a broad audience about science and technology; and to promote the television program as media product.

It is predictable that with this capitalistic underpinning that some nations will dominate. This naturalises a discursive hierarchical national positioning, and constructs a science and technology as a Western discourse on progress. These commercial formations identify narrative focus that is less about the complicated workings of science and more about the progressive good of technological outcomes. This suggests the text has not progressed beyond Gardner and Young's (1981) criticism that such texts present technology that is already highly developed.

Further analysis of the text's discourse reveals the ideological impact of these dominant industrial and economic values underpinnings.

Modes of Address: Modern or New Paradigm Framings?

The name Beyond 2000 signifies the near future. The year ushers in the new millenium, a temporal framework for the Western world to audit the past and predict the future. A new millenium culturally augur's change. Within this context is that change framed around technological developments? This interpellative strategy links the text to a utopian science fiction discourse.

The text uses reality framing to structure a 'true' and fair picture of the scientific and technological facts. Beyond 2000 generically positions within Hartley's (1992) regimes of truth alongside news and current affairs. It uses strategies promoting information as 'impartial' or 'value free'. Like Quantum, the facts in bulletin items. Similarly, it creates its verisimilitude by mixing diegetic actuality in the mode of direct address or reporters, and documentary style mode on location. This mode is non-reflexively augmented with non-diegetic modes of voice over commentary, animated computer models and simulations, graphs, and music, to give weight to its 'seriousness'. On location shots also add authenticity or provide a life-style setting to display the merits of a technology.

These modes of address link to Hartley's (1992, p. 52) view that news as a realist text, lays claims on positioning "the reader as judgemental, impartial, omniscient voyeuristic spectator". The construction of 'reality' and 'truth' links to the ideology of the modern paradigm. The text uses the four member team of reporters rotationally.

The male-dominated team is Iain Finlay, Dr. Caroline West, Andrew Brinkworth, and Anthony Griffin. Their mode of address is less formal than readers of news, or Kelly in Quantum. They sit in arm chairs, on a couch, lean on a fence, or walk through the set. This profiles them as personalties, not just 'impartial' reporters. The relaxed style detracts from their purpose to sell the science and technology. This contributes to the construction of the text as infotainment - intermixing strategies to teach, entertain, and sell their stories. With such dominance of reporters, what opportunity or weight is given for other points of view?

A reporter narrates, comments and closes each story. They dominate the dialogue, the point of view, and the rhetorically closure to the story. They speak for science, interpret the work of science and technology, sell it, occassionally interrogate science, and make it understandable for the imagined global audiences.

The hour long text is segmented into lengths determined by advertising spaces. Conventionally eight items are included. The longest is up to ten minutes. This time restriction limits the complexity of a story, and is a device of closure. The time device paediocrastises the audience through simplifying, fragmenting and compartmentalizing stories to make them semiotically and politically containable. The categorization of stories links with the traditional disciplinary framework of academic institutions.

Linking the categories in news to the institutional categorisation of knowledge, the power of the dominant ideology is maintained. Fiske (1987) discusses the impact of categorising in the news.

> Categories do not only link stories, they also separate them. . . . Categories fragment as well as cohere, and news follows the practice of the public sphere in compartmentalizing social life in order to make it both practically and semiotically more controllable. . . [It] is essentially a reactionary one because it implies that a "problem" can be understood and solved within its own category: localising the definition of problems encourages local "solutions", and discourages any critical interrogation of the larger social structure. (p. 287)

The categories in Beyond 2000 mask the naturalised assumption that only science and technology hold the answers, and identifies the methodology of modern paradigmatic science practice as verifying methodology. These framing strategies promote science as the natural arbitrator of our technological future and endow that future with the value of progress.

The fragmented nature of stories, the dominance of reporters' voices, the limited time allocated, are all strategies of containment and all simplify a topic. The intention is to control audience preferred readings. These strategies align with the dominant practice of the fragmented and reductive focus of the modern paradigm, with its claims on "truth" and "certainty". These representational strategies produce what Hartley (1992) describes as a "paedeocratic regime". Hartley (1992) expands on his notion of a "paedeocratic regime":

> The audience is imagined as having child-like qualities and attributes. Television discourse addresses its audience as children...This regime does not govern all television everywhere all of the time, of course. But there may be a "law" which states: the bigger the target size, the more it will be paedeocratised. (p. 108)

The way a paedeocratised regime constructs a simplified vision of reality, mirrors the tendency to simplify of the modern paradigm.

Nine episodes of Beyond 2000 (1994) are analysed to identify the dominant paradigm framing to narrative subjects and their location. Framing items as medical or environmental stories reveals their potential paradigmatic position as derived from their disciplinary sourcing. Those items derived from military research point to the traditional relationship between scientific research and military institutions. Those classed "advertorial" foreground the industrial relationships of the text and its techno-deterministic agenda. The country of origin of the stories notes who is included or excluded in this "global" vision of the achievements of science and technology. These results were as follows;

TABLE 1. Beyond 2000 Locational and Narrative Focus.

1.1. (Japan). Recreation indoor beach and indoor ski facilities.

1.2. (U.S.A.). Acupuncture drug rehabilitation/crime prevention program. (Medical)

1.3. (Australia). Car cooling aerosol. (advertorial)

1.4. (U.K.). Integrated survival system for divers (medicine/military)

1.5. (Greenland and Denmark). Arctic ice - global environmental health barometer. (environmental)

1.6. (Homeset) (Japanese) Binoculars with radio. (advertorial)

1.7. (U.S.A.). "Heart Zones" music - (medical/environmental)

1.8. (U.S.A.). Genetic engineering - spiders web for bullet proof fabric. (military)

2.1. (U.K.). Computer route-finder. (advertorial)

2.2. (U.S.A.). Racket grip design. (advertorial)

2.3. (Norway). Polymere/dynabeads to fight cancer. (medical)

2.4. (Homeset). Brain waves sleeping device. (paramedical advertorial)

2.5. (U.S.A. & Israel). Computer technology for archaeological analysis of Dead Sea Scrolls.

2.6. (U.S.A.). Bio-sphere 2. - problems. (environmental)

2.7. (U.S.A.). Robotic software design.

3.1. (U.K). Aeronautical research anti-bombing technology. (military)

3.2. (U.K.). Fashion Design - virtual reality technology.

3.3. (Homeset). Television allowance monitor. (advertorial)

3.4. (Italy). Gene mapping - cardio-vascular disease. (medical)

3.5. (Australia). Asiatic-eye shape contact lens. (para-medical advertorial)

3.6. (Holland). Robotic "frog" - sound response.

3.7. (Australia). Synthetic diamond film - electronics and semi-conductors.

3.8. (Japan). Computer building "Aldo Blocks" - problem solving games. (advertorial)

4.1. (Japan). Robotics:- nano-technology.

4.2. (Homeset).(U.S.A.) Computer technology for calculating "jet lag". (paramedical advertorial)

4.3. (U.K.). Diving equipment - prevent "bends"(medical/military)

4.4. (Canada). Music performance - analysis and psychology.

4.5. (Japan). Portable C.D. player. (advertorial)

4.6. (U.S.A.). "Flash-bake" oven derived from computer chip industry.

4.7.(U.K.). Bridge design - computer and fibre optic technology.

4.8. (Australia) Anti-dog fouling device. (advertorial)

4.9. (U.S.A.). Toy testing. - popularity and durability.

4.10. (Japan). Electric Vehicles. (environmental)

5.1. (U.K.). Camera recording bomb technology. (military).

5.2. (homeset). "Voice it" message on digital signal. (advertorial)

5.3. (U.K.). Food research into chocolate obsessions. (paramedical)

5.4. (U.K.) Alzheimers/dementia causes. (medical)

5.5. (on beach) Exercise heart monitor device. (medical advertorial)

5.6. (U.S.A.). Experimental straw/adobe building design. (environmental)

5.7. (Japan). Nano-technology - microbiotics. (medical)

5.8. (homeset). Goggles with built in stop watch. (advertorial)

5.9. (New Zealand). Bi-focal contact lens design.(paramedical advertorial)

6.1. (Switzerland). Mono-trace bicycle/car. (advertorial)

6.2. (U.S.A.). Computer soft ware - death risk assessment intensive care patients. (medical).

6.3. (Australia). "Aladdin" air exhale bends prevention development. (paramedical advertorial)

6.4. (U.S.A.). Aircraft preventing lightening striking technology. (military)

6.5. (U.K.). "Alien Zone" leisure industry. (advertorial)

6.6. (Homeset). Announcement: "Techno-challenge" competition.

6.7. (U.S.A.). Consumer product testing laboratory.

6.8. (Homeset). "Urgo-grip" tennis racket. (advertorial)

7.1. (U.K.). Off-road vehicle. (military).

7.2. (Australia). Fluid Neon Advertising billboards. (advertorial)

7.3. (Homeset). Smoke buster device. (advertorial)

7.4. (U.S.A.). Medical diagnostic radiology/virtual reality technology. (medical).

7.5. (U.K.). "Mottik Modules" - alternate "lego" blocks. (advertorial)

7.6. (U.K.). Technology of office design -"mobility holograms".

7.7. (U.K.). Male infertility: environmental; stress; diet relationship. (Medical/ environmental)

7.8. (U.S.A.). Chewing gum to clean teeth. (paramedical advertorial)

8.1. (U.K.). Robotic security camera.

8.2. **(Australia). Bushfire control technology. (environmental)**

8.3. (homeset). Ergonomic dumb bell. (advertorial)

8.4. (U.K.). Computer networking:- the" wired" village community project.

8.5. **(Japan).** Reverse recycle paper photocopier. **(environmental advertorial)**

8.6. (U.K.). Terrorist proof bins **(military)**

8.7. **(Australia/U.S.A.).** Body rehabilitation - computer games. **(medical.)**

8.8: **(U.K.).** Colon cancer detection technology. **(medical).**

9.1. (U.S.A.). Soft ware/ hardware consumer research.

9.2. (U.K.). Engineering technology - fibre optics for materials fatigue.

9.3. (U.S.A.). "Aqua shoes" fitness/lifestyle product. (advertorial)

9.4. (Homeset). Battery with re-charger plug. (advertorial)

9.5. (U.S.A.). Russian space memorabilia museum.

9.6. **(Holland).** Train track monitoring fibre optic technology.

9.7. (Homeset). Device for prevention of Repetitive-strain-injury prevention. **(paramedical** advertorial)

9.8. (U.S.A.). Portable dialysis machine. **(medical** advertorial)

9.9. (U.K.). "Smart" security key. (advertorial)

9.10. **(Japan).** Fighting toys. (advertorial)

TOTAL ITEMS = 73.

NARRATIVE FRAMING RESULTS: medical = 20; military = 8; environmental= 6; medical and environmental = 2; advertorial= 26.

Advertorials: Paradigm Framing?

The dominance of advertorials highlights the capitalistic ideology underpining the rationale of scientific research and technology. These items promote a developed product. Minimal detail of manufacture is given, but conventionally the reporter has fun trying the product out. They are "lifestyle" gadgets such as chewing gum, a portable heart monitors for aerobics, and an anti-dog fouling device for the garden. The reporter is shown enjoying the benefits of the product on a beach, in a park, driving a sports car etc, aestheticising quality of life opportunities to the product.

Products are not critiqued and are constructed as progress. The science that informed the product's development is made invisible. The outcome is the complex interweaving of social values with advertising values in the context of technology as progress. These stories underscore one of the key dominant rationale or beliefs that Capra (1993, p. 23) identifies as constructing the project of modernity - "the belief in unlimited progress to be achieved through economic and technological growth."

Medical Research and Development: Paradigm Framing.

Medical stories occurred twenty times. This identifies the power within the discourse of science attributed to the medical discipline. Hart (1985) examines the role of medicine as a powerful social ideology and agency of social control. She claims that public confidence in medicine has not been built on a sound record of achievement, it is to a large degree nurtured by myths. Our knowledge of health and the social reality of illness, as constructed by the dominant discourse of medicine, has been underpinned by a belief in the positivism of the achievements of traditional science and technology.

> Medicine is a social ideology underwritten by the 'neutrality' of science, which quite literally defines our understanding, that is our social ideas about what health and illness are like. The occupation of the doctor, is not just a job or a means of income, it is important social status with power over people and their behaviour. It is in this sense that we may speak of medicine as an institution of social control. (p. 96)

Postman (1993) also notes the link between science and technology as critical in reinforcing the power of the doctor in society. "We are surrounded by the wonderous effects of machines and are encouraged to ignore the ideas embedded in them. Which means we become blind to the ideological meaning of our technologies."(p. 94) Highlighting the mythologising of 'progressive' technology he adds: "Far from being 'neutral', technology was the weapon with which disease and illness would be vanquished"(p. 97).

The modern paradigm bio-medic model oriented the physiology of the human body as machine, and the mind as the seat of the soul, the concern of religion religion. Capra (1982) characterises the bio-medic model vision of the human body as being:

> regarded as machine that can be analysed in terms of its parts; disease is seen as the malfunctioning of biological mechanisms which are studied from the point of view of cellular or molecular biology; the doctor's role is to intervene, either physically or chemically, to correct the malfunctioning of a specific mechanism. (p. 118)

This modern paradigm model constructs medicine as concerning illness, rather than preventative health concerns.

The doctor's diagnostic and interventionary role supports new technologies. This focus on illness is further reinforced by the supportive institutional industries of the medical profession. Elaborating on this, Postman (1993) says:

> the culture itself - the courts, its bureaucracies, its insurance system, the training of doctors, the patient's experience - is organised to support technological treatment. . . . Medical competence is now defined by the quality and variety of machinery brought to bear on disease. (p. 102)

Despite the domination of the bio-medic medical model, new paradigm informed approaches to health critique this. Capra (1982) notes we are witnessing a crisis in health care. He says of this crisis:

> Many reasons are given for the widespread dissatisfaction with medical institutions - inaccessibility of services, lack of sympathy and care, malpractice - but the central theme of all criticism is the the striking disproportion between the cost and the effectiveness of the modern medicine. despite a staggering increase in health costs over the past three decades, and amid continuing claims of scientific and technological excellence by the medical profession, the health of the population does not seem to have improved significantly. (p. 131)

Shifting the core value from illness to issues of health, new paradigm medicine seeks to comprehend the holistic complex relationship between the spiritual, psychological, social and environmental factors involved in health.

Capra (1988, p. 178) describes holistic medicine as "the view of health as a process of dynamic balance, the continual interplay between the human organism and its natural environment, and the importance of preventative medicine". Underpinning support for the holistic health movement, is widespread societal recognition of the impact of science and technology, of the deterioration of global environment conditions, and the crisis of "material individualism" (A. Ross, 1991, p. 21). Discourse analysis will reveal the ideology of the medical stories of Beyond 2000.

Military Research and Development: Paradigm Framings?

Eight stories promote military research. These reflect the traditional relationship between institutional funding for scientific research and technological development with the military. Funding for military research and development often deterministically results in the spill over of technological developments into wider non-military applications. These stories provide public relations opportunity to reframe the role of the military into 'peace keeping' forces using technology to deter conflict. Underpinning a modernist military function is the dominant discursive framing of competitive, reductive, hierarchical and binary logics of 'win-lose' metaphors. Reframed new paradigm military logics focus on outcomes framed as co-operative meta-logics of 'win-win' metaphors.

Environmental Research and Development: Paradigmatic Framings?

Six stories, framed by environmental subjects, reflect limited acknowledgment of societal concern for environmental issues and the impact of technologies. This small number suggests an ideological conflict of interest between environmental and technological discourse. Six stories hardly reflects significant recognition for popular support for environmental concerns.

Multidisciplinary Research and Development: Paradigm Framings?

Two items are framed with mixed medical and environmental discourse . One highlights the success of a project combining criminology, acupuncture, and social policy in the area of drug addiction and crime. These more complex knowledge frameworks offer more potential new paradigm preferred meanings. Analysis reveals if this is so. The text addresses a science and technology discourse, and the concept of globalisation. Who is included and who is excluded in this global community?

TABLE 3. Countries Included in Beyond 2000.

U.S.A. - 21 items	Norway -1 item
U.K. - 20 items	Italy - 1 item
Japan - 9 items	Holland - 1 item
Australia - 8 items	Switzerland 1 item
Canada - 1 item	Denmark/Greenland - 1 item.
New Zealand - 1 item	

With the exception of Japan, which links to the major sponsor of the text, these countries represented demonstrate that Beyond 2000 constructs the English speaking first world nations as having primary status within the discourse of science and technology. This constructs, for the global audiences interpellated, either a sense of being included, or excluded from this privileged group of nations. These nations' capitalistic economic and political world positions interweaves with the discourse of science and technology. These countries represented links to those included in the project of modernity. The dominance of reports from the U.S.A. reflects "that whilst modernity began in Europe it developed most rapidly in America" (Smart, 1992, p. 17).

This strategy works to maintain what Said (1978) describes as "orientalism". This 'techno-imperialist' text identifies those who hold the expertise in science and those who speak for science. English is constructed as the official language of science, while the text addresses a broad "global" audience. The text serves the dominant power of traditional Western powers. The globe is divided into those without technology -'them', and a technological 'us'.

This denies a place for alternate sense-making beyond science, or outside Western cultural thinking. This leaves limited opportunity to critique the way the dominant Western ideology positions issues of gender, race and class. Elaborating, Said (1993, p. 95) says that "criticism has correctly focussed upon the institutional forces of modern Western societies that shape and set limits on the representation of what are considered essential subordinate beings". Beyond 2000 culturally reinforces this Western ideology through its construction and representation of people's with technology, and the implied non-technological as absent. This maintains science and technology as essentially a Western discourse.

Discourse analysis of a single episode demonstrates the ways the two paradigmatic framings interweave with science, economic, and cultural meanings.

Beyond 2000: Episode 1.

This episode is chosen because of its impression of it apparent heterogenious representation of preferred meanings. The other eight episodes are dominated by techno-deterministic reports promoting technology at a high state of development.

Narrative Subjects.

1. The engineering and development of an urban recreational indoor beach facility, and an indoor ski centre in Japan. (reporter: Dr. Caroline West)

2. A discussion of the effectiveness of a new acupuncture based drug rehabilitation program for dependent criminals as part of an alternative crime prevention program in the U.S.A. (reporter: Anthony Griffin)

3. An advertorial on location in Australia demonstrating a car cooling aerosol. (reporter: Andrew Brinkworth)

4. The demonstration of an integrated diving system developed by the British Navy. (reporter: Iain Finlay)

5. A report from Greenland and Denmark on research involving the interpretation of the interrelationship between Arctic Ice as global environmental barometer and the impact of changing global pollution factors. This is linked to sustainability problems for Greenland deer farmers. (Reporter: Brinkworth)

6. An advertorial demonstration on the "homeset" of Japanese manufactured binoculars with a built in radio. (reporter Finlay)

7. The developmental history and demonstration of "Heart Zones" music in the U.S.A. to combat stress and heart disease. (reporter Griffin)

8. The on going development in the U.S.A. of genetically engineered spiders' web to produce bullet proof fabric. (reporter Dr. West)

Three of these stories - 2, 5, and 7 present opportunity for new paradigm meanings from their multidisciplinary sourcing.

The Opening Sequence

The program begins with previews of the magazine stories to follow. This is followed by the conventional opening sequence. Then Finlay, sitting on the homeset, previews an item further, and then introduces the first item. This opening strategy structures a very segmented or fragmented flow to the experience of watching. This style continues throughout the program.

The opening shot is a close-up of an ear with several acupuncture needles in it and one being inserted. A close-up shot of the needle shifts to Waterhouse saying: "this is the latest weapon in

the war against drugs." This cuts to a visual of reporter Finlay in a yellow diving suit in a pool with a voice over saying "Iain splashes down to test the all in one survival system". This cuts to images of people enjoying an indoor surfing facility, while a voice says: "holidays in the great outdoors!". The camera then pans across to Dr West, dressed in a mini wrap-around skirt, Hawaiian shift and lei, a male voice over says: "it doesn't matter what mother nature is doing outside - taking control of the elements tonight on Beyond 2000." The visuals then evolve into the conventional title sequence.

The camera pans across a series of orbs simulating the planets and draws into one of the reflective surfaces of a metallic orb. The circular shapes evolve into concentric circles of ripples in water from which emerges focusing the reflection of a child's face, and besides the child (female), the mechanical head of an "E.T." like robot. From the reflective pool the child's hand reaches out towards the water and picks up a glass ball, then shows it to the robot. This cuts to a long shot of the child and robot located on an island of sand surrounded by moving water. In the distance rectangular, oblong shapes stand to signify a city rising out of the water. The child mounts the robot and the two move off towards the city.

The pace changes. The camera moves as if flying, swirling above a futuristic city, with high speed mono-rail running through it, and then cuts to the Beyond 2000 logo. This consists of series interlocking circles reflecting metal and liquid surfaces with the title graphics in the centre. These images are supported firstly by the simple aesthetic sounds of a flute and acoustic guitar, which is then joined by a female chorus while the child is on the screen. When the visuals move to the city, the music pace changes with pulsating electronic sounds.

Visually futuristic, this opening is an expensive attempt to grab audience attention. It signifies an interweaving science and technology, social values and advertising. The mimicking the conventions of advertising, the attention grabbing "flow" naturalises the link between science and technology, social values with the commodification. The quest for a benevolent technological future is linked to the innocent child reaching out in wonderment to an image of a magic future, encapsulated in a crystal ball. The robot is 'humanised' signifying a nurturing technology This identifies a utopian relationship between this innocent quest for progressive technological future. This strategy transfers an image of both awe and wonder to technology.

The standard opening clip celebrates human made structures. Detail focuses on smooth, metallic and reflective surfaces. Nature is represented as only - water, air, sand and patches of green - a setting to display man's creative capacity. The setting is represented as sterile and mono-species. This powerfully resonates modern paradigm cultural values.

Item 1: Artificial Beach and Ski Slope - Modern Consumer Lifestyle Choices.

This is technology as a consumer lifestyle choice. The resorts are developed. The story gives limited critical opportunity to evaluate these developments. The paradigmatic assumptions are hidden. The resorts are promoted as monuments to modernist engineering. This presents the conventional 'gee whizz' approach of Beyond 2000. Only through the nature of the technology - the creation of an artificial 'natural' environment can analysis identify the underscored environmental values.

Ecological Framework: Modern or New Paradigm Values?

Caribbean music plays. A close up shows Caroline rubbing on sun cream, wearing dark glasses, Hawaiian shirt and lei, lying wriggling her toes in the sun. In voice over mode she says:

> There nothing like a day at the beach, just apply the essentials, slip onto the sun lounge, be soothed by the swaying of the gentle plastic palm trees and the waves gently rolling onto the rubber beach. Hang on, wait a minute - plastic palms, rubber beach! Welcome to wild blue Yokohama - 32,000 square metres of tropical island resort. It doesn't matter what mother nature is doing outside, because everything from the temperature to the surf is artificially controlled - everything except the water is *fake* ! No one seems to mind. In these uncertain times it is comforting to know there are no nasty surprises in the great indoors.

Japanese adults and children frolic in the water, playing with plastic sharks. West addresses some of the engineering technology of the resort - waves making, temperatures, humidity, and artificial ultra violet lighting and cost of participation. She later moves to an artificial ski slope also in Yokohama and lauds the engineering technology used to create this. Engineering technology is promoted.

However, while she discusses the technology, through the use of an ironic tone used to emphasis the "plastic" palm trees, "rubber" beach, "fake" etc, the text's meaning opens up to polysemic readings. For the cultural specificities of a Japanese audience the text promotes progressive values. For Australian audience with its different recreational values, this irony directs preferred cynical readings. In utilising this strategy, the text opens up to question the Japanese concept of progress and their environmental values. Emphasising the plastic, rubbery and fake 'nature', draws negative comparisons with an Australian holiday set in the 'real' great outdoors. This results in the conclusions being one of individualistic consumer choice, fundamental to capitalism. As cautionary for an Australian audience, it places a greater value on the opportunity to experience the unpredictability and complexity of the 'real' natural world. This preferred reading identifies more homocentric values.

Regressively the 'them' and 'us' strategy underlines the Western framing to validate modernist dreams. This subversive reading strategy implies an Australian cultural appreciation of the variability of nature, but the motives are homocentric and utilitarian. The report as

capitalistic culture is framed with modern paradigm principles and practices, celebrating the technological outcome of informed by inorganic, static equilibrium and mechanistic models.

Item 2: Breaking the drug addiction, crime cycle with acupuncture - modern or new paradigm narrative framing?

Unlike the previous item, this is a more complex narrative, enabling the application of Henderson's holistic principles. Capra's scientific framework and Merchant's ecological framework are not applicable because it is discursively sourced outside of the domain of science and the environment. The item promote a radical and successful social policy program.

From the U.S.A., Griffin reports on a controversial program to break the cycle of cocaine drug addiction, crime, and the high jail rate through non-violent offenders participating in an alternative acupuncture program. This is helping to break the drug addiction cycle. The question is posed: "Can you hope to win a war on drugs by simply locking up the problem?" The use of the word "you" addresses the audience. It acknowledges growing cynicism towards simplified institutional approaches to what society is increasingly understanding as complex multiple cause and effect issues.

Griffin dominates through direct address or voice over mode. Visually the story constructs a familiar police drama. These include images of drug busts; criminals handcuffed in jail; and drug addicts. Like popular police drama, the plot is driven by getting inside the characters, rather than the drama as action. The characters involved are the reporter, the doctor in charge of the acupuncture program; a married couple on the program; and a 'progressive' judge. Besides Griffin, the married couple and the judge heading the controversial program, are given some voice. The drama takes place in a treatment waiting room, the doctor's room, and the court room. The drama is intersected by fast cutting shots of the conventional solutions of drug busts and jail.

Holistic Framework: Modern or New Paradigm Principles?.

The story defines the interconnected nature of the problem of cocaine addiction as a social, police, medical, legal and economic problem. It presents a more contextual and holistic view of both the individual and societal problem of cocaine addiction. It promotes the merits of integrating an alternate cultural and 'scientific' approach as solution. The solution springs from the synthesizing understandings and points of view.

There is strong emphasis on the key psychological issue of good self esteem, emotional support and humour on behalf of the judge, as essential to the success of the program. The good will and determination of the participant is emphasised. This recognises the multiple ways these positive inputs impact upon a successful outcome. This mobilises Henderson's principle of redistribution noting the economic benefits of a reduced crime rate, and a positive lifestyle change

for the offending participant. The rhetoric is underpinned by the holistic principle of complimentarity. The success of the project is framed as a 'win-win' for all participants. All are equally critical to the success of the program. This identifies the new paradigm principle of heterarchy.

The use of an alternative Chinese medical approach is presented as pivotal to the 'science' of the program. This moves 'scientific' models beyond its traditional Eurocentic parameters. This underscores popular support for alternate medical practices amongst middle class Western audiences. This item presents a radical break with the conventional simplified linear solutions to complex societal problems. Its inclusion in a science and technology text is unconventional. The representation of strong institutional support for this 'alternative' approach empowers the ideology of the new paradigm.

The 'lay' couple is allowed to speak. All participants voice how critical are social factors such as self esteem, community support, and costs. for the success of the program. The narrative emphasises the risks and uncertainty of outcomes. Again this identifies another holistic new paradigm principle. In response to Bell and Boehringer's (1989) criticisms this story does position the issues in a human political context, and goes beyond constructing solutions described "as limited, present-minded and instrumental view of the world" (p. 104).

The narrative concludes: "As public officials world wide face jails cramped with offenders they too could look beyond prosecution to the social causes behind crime." Finally the focus returns to the married couple, Dave and Sue, who at this stage have made it through the first stage. "The cravings are still there so is the will to turn their lives around," says Griffin. The final image is of a close-up of hand cuffs and chains; a conventional law and order image contrasts with the strategies of the program. This is a most unconventional report for a text conventionally foregrounding technological solutions which are dominantly disengaged from socio-political concerns. The strategies employed and argument present in this story present a good example of the way Henderson suggests holistic principles are incorporated into thinking by employing many models, viewpoints, compromise, humility, openness, evolutions, and leaning societies.

The frame dissolves into one of the recognisable segmentation links of microscopic view of sperm moving towards egg, then dividing into four cells. A semiotic link is forged between a seminal idea and the potential rich and fertile outcomes.

Item 3. Advertorial - Car Cooling Aerosol.

This is an advertorial for an aerosol spray that instantly "cools you or your car down". It celebrates human ingenuity in controlling nature, if only on a micro scale. Nature is a lifestyle problem. It provides a setting to foreground the utilitarian values of the product. Broader issues are not

included and fulfils Bell and Boehringer's (1989) category of "limited, present-minded and instrumental view of the world."

Item 4. The Integrated Survival System for Divers: Paradigmatic Framing?

This exalts a diving survival suit developed by British Royal Institute of Naval Medicine. Finlay not only reports this technology but personally demonstrates its capabilities. He demystifies the experience and confers a risk-taking adventurous label on himself. This technology reconfirms a life saving function on military research. The technology is called an "integrated survival system" which semiotically suggests a more holistic approach to its design. Emphasising safety and survival it acknowledges the uncertainties of the "real" world when confronting the elements of nature. Through the key word "survival" the link is made to the more complex environmental subject of the next story: "Up next discovering the benefits of unleaded fuel in the Arctic Ice. The world's biggest barometer - pointing the way to the future!"

Item 5: Arctic Ice as Global Environmental Barometer - Paradigm Framing?

While the camera pans across vast acres of snow, in voice over mode Waterworth says:

> Just 740 kms. from the North Pole is about as remote and isolated as you can get and yet this frozen landscape holds vital clues about lead and ozone levels which shows we can do something about environmental pollution.

On location and wearing a traditional Greenlandic sweater, Waterworth directly addresses the viewer:

> There's probably no better place to demonstrate why Greenland is such a fertile laboratory for environmental research about, than this great glacier here at the head of the Ilulissat Icefield - stretching back 40 kms., the glacier sheds an incredible 20 million tons of ice each day. That's enough to supply the population of New York with enough water for an entire year and all that ice comes from the massive ice cap covering almost 80% of what is the largest island in the world. Those gigantic chunks of ice have accumulated from thousands of years of snow fall.

This rhetoric outlines the complex nature of this environmental story. The laboratory setting for science is a 40 kms. glacier. The report concerns cutting edge environmental science. This sourcing enables the application of Capra's scientific characteristic framework, the identification of Henderson's holistics principles, and the environmental values nominated by Merchant's ecological framework.

Waterworth controls the point of view through out the story by direct address or voice-over mode. He narrates a complex story about research findings, supported by visual images consisting of diagrams, weather maps and aesthetically framed locational shots of Greenland. It interweaves a mix of scientific and cultural values. The research findings, which identify the measurable traces

of pollution in Arctic ice in Greenland, are linked to industrial and urban pollution levels in the United States and Europe. This research mobilises new paradigm thinking. It presents an environmental discourse motivated to understand complex global realities.

The narrative breaks with the conventional 'bad news' rhetoric of environmental stories. It breaks with the convention of environmental concerns being reductively 'balkanised" into fragmented problems. The good news aspect lies in the measurable positive results as consequent to the introduction 20 years ago of lead-free petrol in the United States. Of this Waterford says:

> The latest analysis show lead levels in Greenland snow deposits have dropped by seven and a half times back to below 1969 levels. The latest results reveal the United States to be the hero reducing its lead levels far more than Canada and Europe.

Labelling the U.S. an environmental "hero" for reducing lead levels, breaks with the predominance of alarmist rhetoric filled with emotive outcomes of guilt and blame.

The dialogue is supported by aesthetic shots of an isolated fisherman in a rowing boat surrounded by ice and sea; colourful fishing boats moving through the stark landscape; the colourful Greenlanders' houses scattered on an icy hillside. The images aestheticises peoples whose survival is delicately linked to harsh environmental realities. By the nature of the research and the rhetorical strategies, the report links us all to the realities of Greenland. The story constructs a discourse on the globalisation of environmental realities.

The narrative then shifts from the 'good' news story to the 'bad' news story. Waterford goes on:

> But while the people of Greenland may feel happier that less lead in polluting their Arctic wilderness, they still have cause to worry about another environmental fall out. Something that effects their wild life and their only farmed animal - the reindeer!

This links human, animals and plant reality. Waterworth explains how the lichen that the reindeer feed on is indicative of the deteriorating situation with the ozone layer. His argument is supported by quantified and technologically simulated evidence through the visual support at the macro level by computer derived topographical maps; the hole in the ozone layer over Northern Europe between 1980 to 1988 derived from satellite remote sensing; aerial shots of reindeer farms; to the micro level with laboratories in Copenhagen and with microscopic views of ultra violet damage to lichen. The emphasis in on the longevity of research for holistic knowledge.

While the camera shows reindeer moving across a white landscape cutting to a picture of the earth from space Waterworth says:

> Greenland with its exotic plant and wildlife may be one of the most isolated parts of our planet, but it is still ultimately connected to the activities of billions

> of people across the globe. In this case the Ozone Hole in the northern Hemisphere is slowly spreading from the pole to cover Northern Europe where the lives of millions of people depend on agriculture - in other words plants!

This complex narrative positively links measurable pollution levels in Arctic ice with reduced lead usage in the U.S.A., and negatively links decreased reindeer yields, lichen production, with the hole in the Ozone layer. These findings point to the link between pollution, the hole in the Ozone layer and the negative impact on vegetation and ultimately food production.

Scientific Framework - Modern or New Paradigm Characteristics?

Unlike conventional alarmist approaches to environmental concerns, the story explains the issues in an informative, non-threatening way to the global audience. The story is woven around new paradigm science characteristics. Employing Capra's scientific framework identifies this. The emphasis is not one area of research findings but synthesizes various specialist research and interlinks them to reveal holistic understandings. It is characteristically promoting understanding about a whole global reality, not just the contributory findings as parts. This identifies two of Capra's key scientific characteristic components to trace the paradigm shift from the modern to the new as moving from part to whole; and from structure to process.

The findings are drawn from both macro and micro research and measurement. This is supported by valuing the observations of Greenland reindeer farmers. In line with Capra's third scientific paradigmatic characteristics as moving from objective science to epistemic science, the science is presented as building an epistemic project. The project highlights both the complexity of scientific variables and subjectivities. Mobilising Capra's fourth new paradigm scientific characteristic, the narrative strategy, with its interwoven description of research findings, characteristically frames the knowledge outcomes as a network of findings.

Complex insights require interlinking meanings and understandings from both the fragmented and systemic knowledge discourses, such as ecology, meteorology, climatology, and agriculture. The complexity the research takes into account, promotes the findings as approximate descriptions, rather than truths. This identifies Capra's fifth scientific characteristic component.

Holistic framework - Modern or New paradigm Principles?

Incorporating Henderson new paradigm holistic principles, this item presents the narrative as a "global" story. The rhetoric emphasises the interconnectedness of global environmental realities. It didactically shows the ways reality in one location effects reality in another, identifying the holistic principle of redistribution.

The insights of scientific researchers across the globe, and the insights of reindeer farmers are both presented as contributing to the ultimate understandings of the nature and impact of

environmental pollution. This underscores the principle of heterarchy validating different knowledges, and of the way ozone pollution and global climate change affects us all. The reduction in pollution in the United States is constructed as a 'win' for everyone. This identifies the principle of complimentarity. It is implied that other first world nations should also reduce lead levels. In promoting the complexity and interconnectivity of variables determining climatic change, the narrative evokes the new paradigm, principles of uncertainty and change as being fundamental to the understanding of environmental systems.

Ecological Framework - Modern or New Paradigm Value.

The values that frame the rhetorical underpinnings to our environment relationship in this item are dominantly homocentric. While the characteristics and principles represent engagement with the new paradigm, the cautionary principle underlying the findings is argued along human-centred utilitarian needs. Sustainability concepts are structured around human needs. The ultimate threat if this work is ignored is "a potential food crisis" for humans. Illustrating this Waterworth concludes:

> As the story of lead pollution has shown *we* can reverse dangerous trends - if *we* act now to reduce our impact on the Ozone Layer. Perhaps *we* can overt a potential food crisis ahead. Other wise *we* will be ignoring the warnings of Greenland's environmental barometer at our peril!'

Despite this conventional alarmist rhetoric, the representation of the ways in which human and environmental life forms are interwoven on the planet is saturated with the values of new paradigm ideology. Waterhouse's didactic voice structures its narrative logic across nations, across different research projects enabling the report to more holistically address the complexities of environmental realities to its global audience. Then in sharp ideological contrast to the values of this report, the program returns to its fetishism with commodified technological 'toys for boys' with an advertorial story.

Item 6. Advertorial.

On the home-set, Iain Finlay presents another advertorial for Sony binoculars with built-in radio. Then a preview for the next story, followed by an advertisement break. Again the relationship between education and entertainment; science and technology; products, their commodification and representation of economic wealth; and capitalistic life style choices is interwoven in a fragmented flow of dialogue, images and music. The ideological meanings in the previous ecological items are swamped by its conventional textual ideology and context.

Item 7."Heart Zones" Designer Music: Modern or New Paradigm Framings?

This concerns a medical technology for combating heart disease. The product is the result of the synthesis of understandings in traditional medicine, alternate/holistic medicine, music and computer technology. This multidiscursive focus enables the application of the scientific, holistic and ecological frameworks to analysis. Progressively the item critically evaluates a product rather than just promoting it. It is called called "Heart Zones". Its fundamental beneficial, utilitarian value, is argued around reducing stress induced heart disease. The narrative links the stress of living in urban industrial society and increased heart disease. The designers of this electronic music, derived from research on quantifying physiological and psychological benefits attributed to hearing nature's sounds and music, claim it alleviates stress and therefore measurably reduces heart disease.

Early in the report, Griffin displays cynicism. This separates him from the producers' claims, enabling his role to becomes critical and this strategy opens up the text for the audience to actively make their own evaluations. Griffin links the label New Age with the product, but defensively the producers deny this making claims that discursively shift the rhetorical argument from "beliefs" to "scientific proof". Explaining the technology Griffin says:

> Of course a belief in the power of music is nothing new. We are all familiar with nature's own melodies - birds singing, a waterfall or wind rustling through leaves. And now those elements are being woven into the so called New Age music. There is even a belief that music can stimulate the right hemisphere of the brain which is associated with healing and creativity. But don't call it New Age music. It's official title is bestowed upon it by the U.S. Music Industry is Designer Music - designed as medicine to be taken aurally!

Scientific Framework: Modern or New Paradigm Characteristics?

The modernist bio-medic model focuses on illness. However this technology focuses on promoting health and the prevention of illness. It promotes the link between the mind and health, as a concern of science. Traditionally the modern scientific bio-medic model relocated matters of the mind or the soul beyond of the concern of science. Paradigmatically it positions as a more holistic health research and technology project. It articulates the key scientific characteristics of the new paradigm.

In the explanation of the heart and the prevention of heart disease, the heart in is positioned in relation to the whole body, not just as a mechanistic part. Griffin explains the heart as more than just a pump, but as producing electro-signals, like the brain. This identifies the first of Capra's key scientific new paradigm characteristic components. The text refers to the multiplicities of interconnected processes that construct the network that provides good health. Again this promotes new paradigm scientific characteristics. This network that is the body is linked environmentally through multiplicities of external cause and effects impacting on health.

Stress in the environment is represented through strategies conveying the hustle and bustle of contemporary urban life. The audio track is supported by visual representation of images of crowded New York traffic, masses of people jostling on pavements, traffic signs, horns beeping, general crowding and noise, driving under these conditions while tuning a car radio. To add authenticity to the concept of stress, Anthony Griffin directly addresses the audience while driving through this busy city traffic. His narrative is peppered with related cliches such as: "The things we go through chasing success"; "the day to day grind can be heart rendering *literally* !"; " A whole range of emotions taxing the ticker!"; "Music may truly be the food of love, for a healthy heart!"

This entertaining device presents an already familiar reality to the predominantly urban audience, and presents the story in a light hearted manner. This familiarly contrasts with the complex scientific claims on the product effects. While cliches may be device of closure and containment, they also signify the validity of shared subjective experiences.

The product is introduced with the music playing to a computer graphic charting numerically the music's effects. In voice over mode Griffin says: "Its called Heart Zones and its producers say that they have scientific proof that it will ease stress on our hearts, reduce both emotional and mental fatigue and boost our ability to make decisions and be creative." The scientific proof is presented in the form of measurement of effects of the music on body functions - heart, brain, and pulse. The new paradigm characteristic of the body processes is affirmed scientifically through extrapolations derived from measuring the separate responses such as respiratory, heart, and pulse. Complex technology enables that measurement. That measurement is valued as truth.

As technology constructs this verifiable truth, it casts doubt on the participant's subjective responses. Griffin actually says while wired up to measure his responses, that he found the music somewhat annoying. He adds that the results on the computer screen show otherwise. Technology is presented as more reliable than feelings. Postman (1993) describes this relationship between doctor and technology in building knowledge of a patient, as empowering the practitioner through placing higher ideological value on rational knowledge, objectivity and quantification. Arguments preoccupied with truth identifies characteristic modern paradigm framing.

Griffin defines the project as blending science and show biz. He adds that "researches here are investigating a relatively new medical discipline of cardio-neuro-immunology - in other words, how the heart can effect the rest of the body." The product is the result of the synthesis of specialist knowledge frameworks.

Holistic Framework: Modern or New Paradigm Principles?

"Cardio-neuro-immunology" names a holistic scientific model of medicine. By contrasting the stressful city representations with images of a mist filled valley surrounded by dense forests, the link is made between rejuvenation and life forces connoted by the 'natural' experience and "Heart Zones" music. The "cardio-neuro immunology" research, synthesized with cultural knowledge of the positive effects of music and the sounds of nature, articulates a project framed by the principle of interconnectivity. The health of the heart is linked to a multiplicities of variables impacting upon its function.

The reporter labels the product with new age. He emphasises non-quantitative, mysterious and spiritual dimensions to human health and well being. The significance of environmental quality is is factored to human health. This moves beyond the dominant bio-medic model, with its focus on illness. The narrative emphasises holistic concern with the interdependence of spiritual, environmental, and physiological factors that determine health. This evokes Henderson's principle of redistribution, alluding to feedback model of effects.

Griffin explains "Heart Zones" music role as an integral part of the Institutes' stress management courses. He indirectly endorses the product by stating that these courses have been popular with corporate America, government agencies, religious institutions, even the military. Its use in stress management extends the utilitarian value of the product from the reduction of heart disease in the individual, to wider spiritual, societal, economic, and institutional benefits. This positions the designer music as a wider holistic project. This promotes its usefulness beyond individual health concerns, and identifies the holistic new paradigm principle of complimentarity with the utilitarian outcome envisaged as multiple 'win-wins'.

The story identifies the holistic principles of interconnectivity, redistribution, and complimentarity. There is no inclusion of Henderson's principles of uncertainty and change. This links to pre-occupation by the developers with claims on truth. This identifies a desire to distance the product from a new age label, and to link the product with mainstream science. This rhetorical argument is supported by images of computers, graphs, laboratory-like locations, researchers dressed in white coats, numerous keyboards and complex electronic cabling.

This rationale, rhetorical and visual strategies supports Ross's (1991, p. 20) observation that "the shape and language of holists' claims about alternative scientific knowledge are mediated through appeals to the rationalist language and experimental procedures of the dominant paradigm." Labelling the new age with "beliefs" and a firm rejection of this, demonstrates the difficult and contradictory position of being located 'alternatively' and 'oppositionally', particularly in the area of medicine, which is powerfully dominated by modern paradigm ideology and practice.

This highlights problems in science on the margins, and the degree of comfort afforded in claiming knowledge as 'scientific' through the employment of modern paradigm discursive framings and methodology to determine truth. Ross (1991, p. 20), suggests this tendency to articulate the alternative through dominant practices is a consequence of "the evolutionary structure of all social movements that exhibit a slow development from marginal, visionary origins to mainstream encounters with professionalization and institutionalization". This shows the power given to dominant scientific values, and the institutionalisation of its methods which devalues feelings, emotions and intuition.

Griffin's detached style reflects the difficulty within a mainstream technology text of reporting science on the margins. Whilst this scepticism is healthy in that it opens up the text, the same scepticism is not usually applied to developments that position within the dominant capitalistic ideology.

Ecological Framework - Modern or New Paradigm Values?

The technology is wrapped in visions of aethetiicised nature, and the endowed with the mystical effects the sounds of nature have on human emotions, spirituality and creativity. The story is introduced with a high value placed upon the natural "rural" setting. Griffin's script refers the peace and harmony of a misty valley, of the mystical effects on emotions of the sounds of nature. A binary argument is structured by contrasting the city environment as stressful and the country as peaceful. Paying homage to this, the Institute of Heart Math is located in a misty, wooded mountain valley. This implies ecoculturalist attempts to reposition humans within nature. However this romantic image is still grounded in Merchant's category of homocentric values. It is nature as a setting, nature as health giving, nature as an aesthetic pleasure; its purpose is utilitarian to humanity. The product ultimately celebrate human's capacity to reconstruct 'virtual' natural experiences and effects.

Item 8.

Following this story celebrate man's scientific ingenuity to recreate the effects of aestheticised nature, Dr. West introduces military research by the U.S. Army to genetically engineer spider's web to make bullet proof fabric. Dr West continues the entertaining strategy of catchy cliches: "Up next the spider that could weave a web that's made to measure. It could be spinning you a good yarn." While celebrating remarkable nature, it is pursued for human gain through human control and the ingenuity of scientific research and experimentation. Again these ecological values are homocentric.

The story focuses on the activities of research scientists in a laboratory setting, systematically and painstakingly carrying out their research dressed in white coats. The reporter

dons bullet proof vests and demonstrate the effects of bullets piercing various fabrics. The text highlights, but does not critique the relationship between military and scientific research and development. The story promotes an ecological value through the remarkable characteristics of the spider and the tensile strength of its web But unravelling its mysteries is taking all the intelligence military researchers can muster up. The researchers have no definitive product. While articulating the potential homocentric importance of bio-diversity, the story indirectly acknowledges the wonder, mystery and complexity of nature. The research involves the painstakingly reductive focus of analysing spider's web.

In this final item ballistic military ideology is reframed. The reporter finishes again with a cliche : "So the next time you see a spider weaving its web in the garden - take a second look, it could be spinning you a good yarn!" The item is closed with a cliche to return to what is familiar and entertaining, rather than serious. The cliche is a rhetorical device to limit critical interrogation.

Conclusions.

This episode contained more of the ideology of new paradigm preferred meanings than usual. Several stories concerned items with noted complexity. The three reports of particular interest are: Item 2 - the drug addiction/ acupuncture, crime breaking cycle; Item 5 - Arctic ice a global environmental barometer; and Item 7 - Heart Zones music. These break with the program's conventional uncritical presentation of technology at a high stage of development wrapped in "progressive" assumptive values. The majority of representational strategies support Bell and Boehringer's (1989, p. 104) criticism that such programs "translate into the vernacular idiom of television the more abstract discourses of science to produce a limited, present-minded and instrumental view of the world in which the evaluation of technology with progress is made, divorced from any human political context."

Conventionally the discourses of science are buried beneath a stronger uncritical romance with technology. This strategy links to both the industrial underpinnings of the text. However in breaking with convention the three items do promote the ideology of the new paradigm. No alteration of the text's form is required to enable inclusion of the scientific characteristics, the holistic principles. There is however no inclusion of new paradigm ecoculturalist ideological representations. This points to a fundamental conflict in values with the text's core industrial values and the construction of a technology as progress discourse. This is predictable. Nature is repeatedly used to celebrate human's science problem solving technology's to master it.

Despite this the inclusion of new paradigm ideology highlight the text's role in mediating shifting institutional support to value research and development that draws on new paradigm frameworks. As well these reports indicate producers believe these narratives attract the text's the

imagined global audience. The text indicates new paradigm approaches to environmental, health, and social issues are supported by a significant number of the text's audiences. This links back to those concerns writers such as Ferguson (1992), Houston (1993), and Roszak (1993) identify as contributing to rising globalised framing of concerns. These stories mythologise global issues.

These three items present research and developmental technology has multidisciplinary sourcing and places value on solutions that move beyond the fragmented dominant knowledge boundaries articulated by the modernist academic institutional practice. Multidiscourse means that the interconnections between variables are more likely to be taken into account. The inclusion of these stories is indicative of rising popular support for the ideology of the new paradigm.

In this way the text presents as a site to culturally and institutionally mediate paradigm shift. Solutions presented in this science and technology text were not always sourced from science, and even moved beyond Western thinking. This may indicate shifting support away from science as the primary arbitrator of important thinking in society. The inclusion of the long environental narrative represents an ideological conflict with the dominant modernist capitalistic ideology of the text. The inclusion indicates an ideological shift towards ecoculturalist values and therefore a shift in the fundamental hegemony of the text if only temporarily.

Addendum.

The text's viewing time has moved to a 5.30 pm. weekend spot. This change demonstrates dwindling local audience share. This indicates further audience disillusionment with the fundamental ideology of capitalism underpinning the text. Support for the underlying message of a futures discourse promoting the values of aethiestic materialism, which lies beneath the text's advertorial and life style strategies, may be decreasing. Increased audience awareness of holistic, global points of view, coupled with the personal individual burden of financing these 'disposable' lifestyle enhancing goods, increases criticism of a technological discourse's claims on progress. For a television audience bombarded with the ideology of capitalism, the plethora of technological goods displayed disempowers mass audiences with the implied readings that this is a future they cannot afford, nor participate in.

The stories containing the new paradigm meanings, are didactic. However they do not present *the* answer. Their information strategy is to present the processes that inform improved technological outcomes. These stories synthesise multiple points of view. These stories may begin to answer Gardner and Young's (1981) request for the domain of television science to be opened up. Analysis indicates that opening up the discourse on science involves an ideological shift, rather than a structural one. Incorporating the preferred meanings of the ideology of the new paradigm encourages active reading positions for empowering audiences to feel this is future in which they should actively participate in.

5. Science on TV:Textual Analysis - Regimes of Facts.

5.4 Totally Wild. (1994) Executive Producer: Cherrie Bottger. Ten Network Australia.

Formations: Modern or New Paradigm Imaginings?

Like Beyond 2000, Totally Wild is shown on the Network Ten. However Totally Wild is solely funded by Network Ten. In production for three years, it fills part of Network Ten's statutory requirements for local production, and specific programming for children audiences. A half hour week day program shown at the conventional child audience time slot of 4.30 p.m, it repeats each week day at 8.30 a.m. The executive producer, Cherrie Bottger (1994) says Totally Wild is "specifically designed for the 6 to 13 year old age group". The repeat time reaches an older audience beyond this group, attracting those not engaged with traditional time commitments.

Bottger (1994) outlines the textual focus as being on:

> A wide variety of issues and subjects to stimulate the children's curiosity, sustain their interest and encourage an active involvement in the natural environment. Recorded entirely on location, the series boasts special camera techniques which have been developed to present the younger audience with new perspectives on landform and wildlife. The program offers young viewers across Australia a realistic look at the world they live in, and a complete and up-to-date understanding of what's happening in their environment.

This agenda identifies its purpose as interpellating a young audience to be informed and entertained environmental discourse.

Modes of Production: Modern or New Paradigm Framings?

The text focuses on a "realistic look". This realism is structured by its facts, its documentary style, on location setting and its 'serious' didactic motivation to engage the audience with the matters of science, more specifically environmental science. "New Perspectives on landform and wild life" underlines a desire to narrate issues underpinned by the new ecological and holistic scientific paradigm.

The credits acknowledge the production role of both the Federal Government Department of the Environment, Sport and Territories, and the Queensland Department of Environment and Heritage. Two of the reporters are 'real' 'rangers' with the Queensland Department. They wear their official national park ranger uniforms. They also appear on Channel Seven and radio in Queensland. The credits thank those government departments, and universities who co-operated in the production. These practices link the text to an institutional pedagogic agenda. According to Hartley (1992) pedagogic interventions range from attempts to guide, channel, and inform viewers, which he says is usually found inside TV and the press in the guise of promos, reviews and features.

The mix of institutional and industrial needs points to the text containing a heterogenious mix of ideological meanings.

This pedagogic regime links to a governmental agenda objective to actively engage the Australian community, in this case the youth of Australia in the issues of environmental science. In this way Totally Wild links with both Quantum and Beyond 2000 in media involvement in the promotion of science to various audiences. However in the case of Totally Wild the 'clever country' is to be built on specific knowledge and appreciation of environmental discourse.

The credits name those corporations involved in the production. Toyota "sci-fleet" vehicles, Sony handicam, Lynx footwear, Sportsgirl clothes, Mont Adventure Equipment (rain wear) and Coca Cola all signify lifestyle products, whose marketing strategy is linked with pursuits in the "great outdoors". Promoting the use of these, the reporters materialistically signify the fundamental capitalistic value of consumer fetishism to the young audience.

Claiming the text's effectivity in actively engaging with its audience, Bottger (1994) says they receive approximately 2000 letters per week requesting project information, alongside other mail: "Demographics calculated on capital cities on the Ten Network show that three million and seventy thousand people watch the show weekly. I guess through regional stations Australia wide you could add another million."

Bottger's rhetoric points to an agenda to engage a young audience through a populist approach to environmental science to interpret the world around them. This ecological perspective identifies a high value placed on the ideology of the new paradigm. In setting the context for this ecoscience exploration of the 'real' accessible world, the program reframes the modern paradigm laboratory setting, or a promotional setting for technological developments. This setting indicates opportunity for the representation of key new paradigm meanings .

Modes of Address: Modern or New Paradigm Framings?

Bottger (1994) describes the text's mode of address as "semi-documentary style presentation". Generically structured similarly to Beyond 2000 and Quantum, the program is divided into 'bulletin' segments directly related to news practice. Within the half hour an average of six items is included along with advertisement breaks. The longest story is about five minutes in length. Similar to Beyond 2000, time is allocated within the text to pre-view stories. Conventionally a "semi-documentary" bulletin program, the text positions within Hartley's (1992) "regimes of truth".

Fiske's (1987) discussion on realism indicates the forms links with pedagogic formations:

> Realism does not just reproduce reality, it makes sense of it - the essence of realism is that it reproduces reality in such a form as to make it easily

> understandable. It does this primarily by ensuring that all the links and relationships between the elements are clear and logical, that the narrative follows the basic laws of cause and effect, and that every element is there for the purpose of helping to make sense: nothing is extraneous or accidental. (p. 24)

Bottger claims the text uses techniques such as its high modality, structured through location, camera positions etc, used within the factual generic form, to both engage the audience and enable them to comprehend the information presented. The pedagogic agenda goes beyond the digestion of information, to interpellate audiences to apply that understanding in making sense of their local and national physical environment. The camera techniques referred to, address different points of view. Close-up framing brings the realistic micro world to a macro positioned eye. Camera angles and positioning draw on a MTV youth culture tradition. Hand held camera work places less value on the text as expensive technology as is the case with Beyond 2000. Rather, hand held camera work places value on getting out there in the wildscape, and empowers children to use video as their information recording medium. The modes of address inform about wonders of the environment and not the technology presenting it. This strategy promotes more the ideology of the message and less the ideology of the medium.

The reporters, called "rangers" are young. In the 1994 series there are four girls and two guys on the team. In the 1995 series there are more reporters - five women, one a vet, and four men. In this series they are called "wild adventurers". This indicates a more aggressive marketing strategy to interpellate an audience. While "ranger" signifies institutional employment, "wild adventurers" is empowering and inclusive of the young environmentally aware audience. The reporters dominate the rhetoric. Their informal dress and rhetorical style does not distract from their credibility and authority. Their authority is supported by the voices of on location experts. Their credibility is derived from both enthusiasm, and knowledge. While academics, and researchers are given voice in the text, equally so too are children's voices. These strategies break with the hierarchical ideology of modernist institutions.

The modes of address, in acknowledging the pleasures of its audience, moves away from the traditional approaches of serious science texts. At the same time these stay within the generic boundaries used to articulate truthful, serious, and realistic forms of reality. The narrative framing of eight episodes are examined.

TABLE 4. Totally Wild: Narrative Framings.

Episode 1. (1994)

1. Skyscraper window cleaning - technology and world.
2. March hen/coot animal profile.
3. Questicon science centre.
4. Veterinary research - career profile.
5. Albino kookaburra - keeper and specific care.
6. Project sheets.

Episode 2. (1994)

1. School insect survey study report.
2. Analysis of beach rubbish.
3. Fur seal in marina - victim of human cruelty.
4. Storm water drains pollution - school project report.
5. Transportation of marine animals for marine park.
6. Bushfire damage - Royal National Park.N.S.W.
7. Project sheets.

Episode 3. (1994)

1. Children's python - profile.
2. Facts - feathers as rubbish.
3. Pyrography - art.
4. Facts - brolga - profile.
5. Dairy research - report and careers profile.
6. Function of the National Film and Sound Archives.
7. Project sheets

Episode 4. (1994)

1. Horse care - work profile.
2. Scorpion - animal profile.
3. Flying garbo - Royal National Park helicopter rubbish removal - report.
4. Facts - bee eater bird.
5. Zoos cryo preservation of endangered species - report.
6. clothes design to combat skin cancer.
7. Project sheets.

Episode 5.(1994)

1. Report: problem of introduced animals in an national park deer, cats, dogs.
2. "Frilly fact" - question.
3. Profile: cattle - drought masters variety.
4. Allergy: people and animals - skin tests.
5. Animal profile - catfish.
6. Profile: raptors -birds of prey, care and rehabilitation of sick birds.
7. "Frilly Fact" - answer, and project sheets.
8. Project sheets.

Episode 6. (1994)

1. Report: recycling concrete.
2. Animal profile - platypus.
3. Profile: career - ranger.
4. Facts - chlorophyll.
5. Report: phytophera - jarrah dieback.
6. Animal profile: water rat.
7. Report: new zoo facilities for orang-outang- Taronga Park Zoo.
8. Project sheets.

Episode 7. (1994)

1. Report: pineapple recycling for dairy cow fodder production.
2. "Notebook explorer": gecko tail dropping.
3. Report: Botanical art- illustrator explains process and role of herbarium.
4. Question and Answer - crustaceans.

5. Discovery Park - training wild and domestic animals -"circus".
6. Computers: virtual mining.
7. Report: foster mother - care of orphaned koalas.
8. Project sheets.

Episode 8. (1995)

1. Electric/acoustic sounding guitar - development and manufacture.
2. Global warming.
3. Report: James Ruse Agricultural High School.
4. Report: "Trike" motorized hang glider.
5. Unusual fish.
6. Project sheets.

The narratives identify subject focus on animals and plants. But what ideology underpins these narrative? It is expected that, in addressing a child audience, a number of stories centre on the 'cute and cuddly" variety. However this is not so. The animal world is represented variously, with a equitable cultural value placed on them. The text does not separate the 'natural' world from the constructed human-centred urban environment. Reports focus on the ways these are interlinked together. This is done through different reports being linked by location - e.g. the various stories presented from the Royal National Park. These interweave together to inform the audience of the complexity of issues involved environmental management.

Ideologically the modern paradigm positions humans outside of nature. The narratives presented explain the diverse number of ways, through employment, voluntary work, schooling, artistic practices and hobbies, that people engage scientifically, culturally and spiritually with nature. Through narratives drawn from the urban 'engineered' setting within this dominantly ecological focused text, the technological achievements of man are represented as not exempt from the power 'laws' of nature. Do these narratives present ecological values, or celebrating humans' capacity to dominate nature?

Episode 2 is examined further because of the ways the separate stories interweave ecological and human concerns to contribute to potential holistic understanding of environmental realities.

Episode 2 (1994) : Narrative Topics.

1. School insect survey study report.
2. Analysis of beach rubbish.
3. Fur seal in marina - victim of human cruelty.
4. Storm water drains pollution - school project report.
5. Transportation of marine animals for marine park.
6. Bushfire damage - Royal National Park N.S.W.
7. Project sheets.

Opening Title: Paradigmatic Framing?

The opening sequence in the 1994 series consists of a graphic representation of a number of Australian animals. These are constructed through line-work drawings on white textured paper filled in with watercolour wash. Simple animation enables animals such as a dolphin and a crane to move from one frame to fade in another. The globe is represented by a circle gridded by the lines of latitude and longitude. The crane moves across the globe in the foreground. This strategy places value on simple representational art, with little emphasis on technology. This empowers the young audience's artistic capacities. The movement signifies a link between animals. Some animals are represented moving towards the camera, others move across the screen. The supportive introductory music draws on sounds that evoke jungle animals - elephant-like trumpets, monkey-like screams, with a simple pulsating beat. The focus on animals, while interpellating an audience, constructs reductive focus and fails to contextualise these animals environmentally.

The 1995 series opening mobilises a more ecologically holistic construction of the environment by representing the animals in a dynamic 'landscape'. This is constructed through a mixture of real footage, artwork and animation. The style is again "naive".

Item 1: School Ir ect Study Survey.

Scientific Framework: modern or new paradigm characteristics?

This item reports on a primary school project surveying insects. While the focus is on insects, information in the report contextualises them environmentally. Attention is drawn to the different order of predators of insects and the link between a complex vegetative environment and a complex representation of insect varieties. The children are studying insects as a part of a complex rehabilitation of farmland project. The activity is constructed as 'doing' science.

According to Capra's scientific framework, this narrative incorporates key scientific components of the new paradigm: While the emphasis is on a reductive part of the animal kingdom, the rhetoric places these in the whole environment. In focussing on insect predators and the diversity of plant food sources for insects, the textual emphasis is on insects as part of interlinking processes. This structures the discourse on knowledge contained in the story as metaphorical network, rather than reductive focus on insect as metaphorical building.

In enabling the children to explore insects as 'scientists' in the real world, their observations are constructed as valuable. This shifts the point of the activity from affirmation of truths to building descriptive understandings. Noting complexity highlights findings as approximate descriptions. This simple narrative calls the young audience to do new paradigm science.

Holistic Framework: Modern or New Paradigm Principles?

Applying Henderson's holistic framework to both the rhetoric and the visuals, there is emphasis on the principle of interconnectivity. In describing a healthy environment, the rhetoric highlights the relationship between the limited dominant insect varieties, to minimal plant diversity, resulting in an unhealthy environment. Diversity is emphasised as a healthy environment. This identifies the new paradigm principle of redistribution. Articulating the significant role of predators, insects and plant life points to an interdependent heterarchical relationship. Henderson names heterarchy as a key holistic principle. A healthy environment is articulated as successful for both predators, insects and plants. This identifies the new paradigm principle of complimentarity, where the balance constitutes a 'win-win' for all.

The students carry out this survey frequently, noting the differences as introduced plant species develop. Through this change is structured as inevitable and this dynamic emphasises the uncertainty of results from one survey to the next. The discursive representation of the holistic principles of uncertainty and change, position this report as promoting new paradigm meanings.

Ecological Framework: Modern or New Paradigm Values?

In promoting both the scientific characteristics and the holistic principles of the new paradigm, high value is placed on the role of insects in contributing to a healthy environment. That concept of environmental health is not built on human needs, but on the interdependent needs of the bio-system. This promotes ecocentic values.

Item 2: "Notebook Explorer" - Beach survey.

Modern or New Paradigm Framings?

This cameo report tells how to carry out a "scientific" pollution survey on a beach. The audience is told to survey and collect 100 items from 100 metres of a beach at the high water tide mark. These are to be divided into groups - organic and inorganic. The percentage ratio between organic to inorganic gives the "pollution ratio". While the emphasis is focused reductively on the measurement of pollution as a part of a beach, it emphasises the whole environment and the problems this means for certain species. In promoting the audience to "do" science, the knowledge and insight is valued as approximate descriptions. This report identifies pollution as a problem for various marine species. Ecocentric values are promoted. Despite the short length of this item, its characteristics and values link to those holistic and ecological ones of the previous story, reinforcing the ideology of the new paradigm.

Item 3: Fur Seal in Marina.

Modern or New Paradigm Framings?

This is a report about "Furry", a performing fur seal in a marina. The story tells the history of the seal in the marine park. Initially the seal is seen performing enthusiastically and skilfully for an audience. Conventionally performing seals would centre articulate homocentric values for their ability to entertain and give pleasure to humans, or celebrating human capacity to 'mend' injured animals. However this item is reframed to value the seal's needs.

The rhetoric informs that the majority of animals such as these end up in marine parks because "often human's have done the damage". This seal is a "victim of humans". He was found with a "fractured skull which was badly infected". Close up footage of the seal's skull reveals the damaged area. The skull was rebuilt over nine months. In that time he became adapted to the marine park environment. To release him back into the wild would be potentially fatal. So, to earn his keep, he must perform in the marine park. The reporter sums up by celebrating the adaptive and performing skills of this "unique and clever animal". Despite the anthropomorphism, this alternative perspective on marine park animals reframes the underpinning values from homocentric to ecocentric.

Item 4: Storm water drains

Modern or New Paradigm Framings?.

This report tells about the holistic and ecological nature of storm water drains in a city context. The story is structured around a "bad news/good news" binary structure. The rhetoric outlines the "job" or function of storm water drains. The visual footage supports the anti-pollution discourse with images of drains releasing water into aestheticised 'pristine' situations as well as polluting waterways. The ranger/narrator outlines the interconnected principle of storm water drains.

The "bad news" story emphasises the negative impact of human caused pollutants. This negative impact promotes understanding of the holistic principle of redistribution. The ecological impact of this draws attention to the inevitability of uncertainty and negative change impacting on environmental health. The "good news" story articulates a program being undertaken by inner city primary school children to inform the general public about the function of storm water drains to reduce the pollutant rate. This they are doing by spray painting signs on the footpath by storm water drains telling where they go, and pointing to the dynamic connection with the natural environmental drainage system.

Implicitly adults are constructed as irresponsible pollutors. Giving such a voice to children (several children are allowed to speak), places cultural value on children's point of view. This is reinforced by their action. This identifies the new paradigm principle of heterarchy. This empowered role for the children is reinforced by the weight given to the government expert with

his reinforcing supportive tips for controlling storm water pollution. This principle of heterarchy highlights multiplicities of cause and effect interconnections required in deducing new paradigm ideological solutions.

This item promotes ecocentric values. It emphasises the needs of the ecological system, not humans, and links the human engineered environment and the wider ecological system. Technology is repositioned within nature. This story contains a key ecocultural ideology.

Item 5. Moving Marine Park Animals.

This light hearted report links with the previous one on the injured seal and further promotes the work of marine parks, vets and rangers.

Item 6. Bush Fire Damage.

This report is filmed in the Royal National Park three weeks after the park experienced 98% burning by a severe bushfire. While the opening shots are of news footage taken during the horrendous 1994 fires in N.S.W., the item celebrates the recovery capacity of the bush. This report reframes a "disaster" focussed "bad news" story, with footage drawn from news to a "good news" story. The reporter criticises the proliferation of "alarmist media pitches", which claimed the fires as "ecological disasters" where "some areas would not recover", where "some species were threatened by extinction". Here the rhetoric focuses on "fire as a natural event" and natures regenerative capacity -"Mother Nature packs a punch when it comes to fighting back!" Indirectly the item promotes the values underlying Gaian theory through this example.

The reporter and a ranger discuss how "the miracle of revegetation is progressing in leap and bounds.", how "fire is a natural event", and how "the bush is adapted to fire". While crouched down on the burnt landscape they enthusiastically note the regenerating native grasses, black boys, hakeas and banksia plants. The ranger explains how without the previous competition for light these plants thrive. Seeds germinate because of fire; soil fertility is increased because of the ash. The regeneration is also signalled by the numbers of busy insects - ants; bush cockroaches; weavils and spiders. The ranger concludes that twelve months later there will be little evidence in this "scrub" area of the disaster of the fire. The wonders of nature are mythologised.

In framing this holistic, regenerative process as a miracle, and reframing a bush fire as a "natural event" rather than a "disaster", the item promotes ecocentric values. This item links to several in others covering the environmental management of a large national park in an urban environment. This report is saturated in ecoculturalist values.

The program conventionally closes with a ranger inviting the audience to send in for a "project sheet" containing information on the topics covered. Drawings and mail sent in by the

audience are often shown, and one child wins a "Totally Wild" prize pack each day. Despite the implied capitalistic commodity fetishism, in line with more ecological values , this prize is comparatively small and simple.

Conclusions.

Totally Wild is dominated by the ideology of new paradigm meanings. When the narrative concerns science, the dominance of contemporary ecological framing enables the representation of Capra's key scientific characteristics. While the text deals with a wide variety of narrative concerns, the predominance of this ecological messages promotes Henderson's holistic principles. This is reflected in both the narrative concerns and the representational strategies employed, such as the presentation of less authoritarian, more heterarchical mix of individual and institutional points of view. Similarly, the ecological framing to narratives and representational strategies articulates a significant number of reports as constructing ecoculturalist perspectives and values. With this text's ideology saturated by new paradigm meanings, and its major audience imagined as young, producers also imagine a young audience as being more open to such ideological meanings. The predominance of new paradigm ideology implies consensus about the validity of these meanings with this audience. The implication of this being that as this audience grows up new paradigm meanings will be the dominant ideology. And employing strategies that actively empower this audience to utilise this sense-making may hasten the ideological shift.

5. Science on TV: Textual Analysis - Regimes of Facts.

5.5 Findings Discussion

The three texts Quantum, Beyond 2000 and Totally Wild are "infotainment". Their generic boundaries and strategies link with the conventions of news. News frames its narrative concerns around ideological containment of conventionally structured "bad news" stories that articulate to reinforce hegemonic power.

These three texts, with strong agendas to promote the achievements of science and technology, present their audiences with "good news" stories. Despite similarities these "good news" stories address different agendas. Tracing the paradigmatic underpinnings of the different stages of the process of communicating preferred meanings from producers to readers reveals the complex and interconnected nature of this. Analysing the various strategies employed at each stage of meaning development structures an interlinked network model for determining the ideology underpinning the preferred meanings.

In articulating a text's formational agendas the modes of production and modes of address discursively link to naturalise the dominant preferred meanings. Formational agendas and modes of production powerfully interlink with the ideology of their industrial, institutional and financial underpinnings. Linking with this, the ideology of their paradigmatic underpinnings depends on the paradigmatic framing of the disciplinary knowledge from which information is sourced. This thesis' multidiscursive scientific, holistic, and ecological framework analyses how, despite these three texts employing similar generic representational conventions applied to the presentation of science on television, their rationale, ideology and meanings vary greatly. They all incorporated some new paradigm ideology. This reveals varying popular support for the new paradigm.

Quantum's "good news" stories link with the hegemonic practices of the university academy from where the majority of stories are sourced. This combines with a policy agenda to sell science to the national audience in order to make Quantum's contribution to the culturally reframed 'clever country'. These agendas weigh heavily on the meanings included. The result is little new paradigm preferred meanings within the conventional format. Greater engagement results from the more open and holistic project framing the "New Genesis" episode.

This result identifies a conflict for producers between promoting science and reporting science. For American science journalism academic, Ruppel Shell (1993) it is the job of public relations professionals, not journalists, to unquestionably promote science. She argues that science journalists "have to give readers or viewers enough information and enough points of view so they can make up their own mind, and that's a pretty big distinction from providing *the answer* (p. 47). "The New Genesis" episode tries less to present 'the answer'. The conventional Quantum is a half

hour of television divided into items telling the audience about tonight's four answers. Quantum addresses audience needs less than institutional needs.

Despite Beyond 2000's length it uses the same fragmentary strategies over an hour time frame. Dominating Beyond 2000's desire to inform its audience is closed meanings created by its industrial structuration. As a result commercial and capitalistic values are interwoven into its discourse on science and technology. This text employs strategies that structure it as a promotional exercise, rather than interrogating the developments of science and technology. Like Quantum there is a formational conflict between promoting the people they present, or in this case products, and meeting the responsibilities of the audiences they should serve.

Totally Wild's agenda lies in "stimulating the children's curiosity, sustaining their interest, and encouraging active involvement in the natural environment". This positions the text's declared formational agenda as being audience focused. This agenda links with its chosen strategies using more open modes of address to discursively mobilise predominantly new paradigm meanings within the text. Analysis of Totally Wild reveals the ideological link between new paradigm meanings and the representation of more open and diverse points of view.

All three texts use high modality, semi-documentary style realistic representational strategies. The points of view are dominated by the reporters who present, interpret and sum up. Their role is predominantly one of containment and closure as their authority is constructed to present their arguments.

The segmented nature of the items is a strategy of containment. This containment is device to structure a discourse that places high value on answers or solutions. Modern paradigm informed answers are constructed as 'truths', while new paradigm informed answers are constructed as open approximate descriptions. Containment is used in all three texts to direct audiences to both modern and new paradigm meanings.

All three mediate new paradigm scientific characteristics, holistic principles, and less ecological values. Quantum contained the least examples. This result is disappointing particularly considering its strong agenda to present the contemporary achievements of institutional based science and technology. It reflects little support for new paradigm models within the science institutions of Australia. Quantum relies heavily on the academy to "authorise" its point of view. Those given a voice in the text other than reporters tend to hold doctorate degrees. This hierarchical weight of voices links to a hierarchical positioning of the modernist science discourses. These institutional framings culturally resonate the values of the modern paradigm. How can Australia become a 'clever country' without institutional recognition of a revolutionary paradigm shift in science?

Beyond 2000, is framed around a "futures", and a progressive science and technology discourse. It fails to engage with new paradigm meanings to any significant degree. This results from its industrial/ commercial formational origins and similar institutional sourcing as in the case of Quantum. Analysis reveals that Beyond 2000 predominantly sees its role as promoting technology. The outcome of this is discussed in Bell and Boehringer's (1989) criticisms that this approach results in the failure to discuss technology in a human political context, and presents solutions as limited, present-minded and an instrumental view of the world. For science journalist Stuart Diamond (1993, p. 46), the failure to reveal the processes of science is what keeps people from understanding technology, and promotes them to be suspicious of it. This points to a conflict between production claims and media effects.

However while maintaining the text's conventional representational structures and strategies, several stories did engage with new paradigm ideology drawn from socio-political, medical and environmental discourse. This shows emergent support for the ideology of the new paradigm by a text conventionally swampt by the ideology of capitalism and the modern paradigm.

In contrast to the other three, Totally Wild, engages the most with communicating new paradigm preferred meanings to its young audience. This links with its strong formational agenda to do just this. Totally Wild employs a less authorative didactic style to interpellate its young audience. This serves to "stimulate the children's curiosity, sustain their interest and encourage active involvement in the natural environment". In contrast to Quantum's predominant support for its institutional underpinning, Totally Wild attempts to meet audience needs.

A strong national involvement with science, and significant exposure to science through various media, is seen as a pivotal cultural contribution to building a "clever country". The analysis findings of Quantum and Beyond 2000 highlights the need to criticise producers who are apparently unwilling to tell predominantly adult audiences "factual" and challenging new paradigm stories. No doubt these producers would in return criticise scientists who perhaps are failing to "do" new paradigm framed research, and develop new paradigm solutions and technology. And obviously the scientists would point to a lack of funding. There is an urgent need for television science in interpellating its audience through facts regimes to engage with new paradigm scientific approaches to address both global and local concerns. 'Factual' science media need to critically re-evaluate whether it is institutions, or audiences they produce their products for.

Chapter 6.

6. Science on TV: Textual Analysis - Regimes of Fiction.

6.1 Introduction.

In structuring the interrelated processes of meaning production as outcomes of various representational choices, fictional regimes differ from those constructing factual regimes. Fictional regimes use different signification, narration, and reading strategies underpinned by different economic, industrial, technological, political, ideological and cultural processes to produce preferred meanings. These representational choices cohere to construct different interpellating strategies. The prime interpellation function of regimes of fiction is modes of reception interpreted as entertainment and pleasure.

The different conventional structures and representational strategies used by fictional texts mobilise different systems of orientation, and expectation for audiences In structuring the text as entertainment these representational strategies discursively frame the text differently to 'serious' informative strategies. In comparison to factual regimes, fictional texts engaging with science, position science differently within a hierarchy of discourses. Factual regimes engaging with science position science high within the discursive framing. Fictional texts place science less dominantly within their hierarchy of discourses.

The three texts chosen for analysis in this fictional category are Captain Planet and the Planeteers, The X Files and Skytrackers. These texts use different rhetorical modes. These are various strategies to interpellate different audiences, but populist rather than specialist audiences. At the top of their hierarchy of discourses is an agenda to entertain through modes of fictional story telling.

Captain Planet uses the low modality convention of cartoons to address a child audience. The X Files articulates an intermixing of the conventions of both the film genres of science fiction and horror into a serialised television text. Its iconographic strategies interpellate an adult ('M' rated audience). Skytrackers utilises realistic serialised fictional drama drawing on the conventions of soap opera to interpellate an older child, adolescent audience. All are underpinned by an industrial agenda to interpellate international audiences.

Though structured as fictional entertainment, all three programs engage with the 'factual' discourse of science to frame meaning production. However utilising this mode of address does not necessarily mean that the science discourse is positioned at the top of the hierarchy of discourses. The science discourse is positioned within a fictional social context. The strategies conveying 'realism' to a fictional social context varies according to the the various different modalities used. Each of the texts constructs a believable contextual reality for their story telling.

Serious science television texts have been criticised by writers such as Gardner and Young (1981), and Bell and Boehringer (1989) for their failure to address the issues of science in a socio-political context. Placing discourse in a fictional context potentially expands the multiple discursive framing to the preferred meanings. This potential multidiscourse contributes to the more open nature of a fictional text, allowing more polysemic reading positions.

Analysis of these three texts identifies the impact of fictional representational strategies of the preferred scientific meanings constructed in them. Applying this thesis' analytical model: the scientific framework; the holistic framework; and the ecological framework enables discussion of the paradigmatic thinking directing the preferred meanings. Analysis may show if any link can be made between representational strategies and paradigm meanings.

6.2 Captain Planet and the Planeteers (1991), Executive Producer: Nicholas Boxer. TBS Production Inc & Dic Enterprises Inc.

Formations - Modern or New Paradigm Imaginings?

Captain Planet and the Planeteers is an animated cartoon series developed from an idea instigated by Ted Turner, the founder and owner of CNN broadcast network. Ted Turner has a strong economic and political commitment to the globalised concept of media services through satellite technology. This commitment is reflected his CNN news service which has been pivotal in instantaneously reporting on critical political events such as the Gulf War, the demise of the Soviet Union and the Soviet Communist Party, the Tiennamin Square massacre etc.

According to an ABC Radio National "Media Report" Special (1995) on Ted Turner, Bill Clinton has said he gets more information sourced from CNN than from the CIA, and key archbishops in Rome listen to CNN to know what to pray for each day! Turner has also expressed significant commitment to environmental issues. The link between this powerful global media figure and the seminal formation of this text is critically significant in identifying its formational context. The result is a product to inform and entertain a young global audience.

Underpinning that entertainment production is a mythical futures narrative engaging with contemporary global social, environmental and political realities. The entertainment mode of address is applied to a pedagogic regime. This reframes the fragmented meanings that children see presented in 'serious' adult focused media. The formation of this text strongly promotes ideological commitment to global and ecological perspectives that link to new paradigm thinking.

As is the convention with children's programming produced in the USA, this text has merchandising associated with it. This commodity fetishism contradicts the apparent ideology of the text. There is a conflict between an agenda to promoting pedagogic messages and capitalistic messages. This ideological contradiction naturalises the heterogeneous meanings in media texts.

With the text broadcast on public television in Australia, there has been little promotion of merchandise, so this is less significant for Australian audiences.

Harvey (1989) links the postmodern condition to the end of meta-narratives. However comparative mythologist, Campbell (1988), discusses the impact of the new paradigm science on the development of potential new global mythology. Campbell argues that the only myth that is going to be worth thinking about in the immediate future is one that is talking about is global, not the city, not people, but the planet and everyone on it. He expands on this further:

> And what it will have to deal with will be exactly what all myths have dealt with - the maturation of the individual, from dependency through adulthood, through maturity, and then to the exit; and then how to relate to this society and how to relate this society to the world of nature and the cosmos. That's what the myths have all talked about, and what this one's got to talk about. But the society that it's got to talk about is the society of the planet. and until that gets going, you don't have anything. (p. 32)

This text mythologies a meta-discourse framed by global and ecological new paradigm thinking to its young audience. Discourse analysis reveals the ways these preferred meanings are included.

Modes of Production:- Modern or New Paradigm Framings?

Captain Planet and the Planeteers is shown on the A.B.C. at 5 p.m. during its children's afternoon programming. During the past two to three y .rs the A.B.C has shown episodes from the 1990, 1991 and 1993 series. These are repeated regularly. Its target audience is 4 to 12 year old. With regard to cartoons, Hodge and Tripp (1986) found that children learned quickly to distinguish between the different modalities of TV's reception.

Fiske (1987, p. 76) defines modalities as the apparent distance between the text and the real. He argues that the low modality of cartoons clearly invites fantasy. Fiske (1987, p. 242) also explains that the some of the pleasure derived from cartoons is born of their tendency to invert 'normal' relationships, and show adults as incompetent, unable to understand, and the children as superior in insight and ability. This strategy is significantly conventionalised in Captain Planet. It is a device to give both pleasure and empowerment to its young audience, and encourage them to impose the values of the text on the adults around them.

In utilising a cartoon mode of production, the narrative subject is not restricted by the high economic costs associated with high modality realist modes. The cartoon mode enables complex use of locational settings for stories without an increase in production costs. This enables the representation of diverse cultures and geographic locations. This choice links with the agenda to address global points of view through diverse narratives subjects. This production mode has potential for the development of stories telling the new paradigm vision of reality.

This mode of production also enables a containment of costs in presenting a futures discourse. The cartoon mode allows simple signification strategies to connote shifts in narrative time frameworks. Conventionally this is signified through the representation of characters utilising technology not yet available in the present. Again the costs of this mode of production are not affected by these representational strategies. The open nature of representational choices resulting from this rhetorical mode reflects opportunity to represent the more open discourse of new paradigm thinking.

Modes of Address: Modern or New Paradigm Framing?

In discussing the interpellating characteristics of cartoons Seiter (1992) says:

> The reason children are fascinated by cartoons is not because they have been turned into TV zombies, but because they are understandably engaged by the complex blend of aesthetic, narrative, visual, verbal , and ideological codes at work in them. Though cartoons are characterised by a great deal of repetition and redundancy, Hodge and Tripp argue that their subject matter and their way of conveying it is complicated stuff. Children use cartoons to decipher the most important structures in their culture. (p. 50)

Seiter says that cartoons promote active reading practices in their young audience. These insights point to another reason for chosing this rhetorical mode. The cartoon format also enables the narrative settings for the stories to be situated variously across the planet, in different cultural settings, and to structure a 'futures' discourse. This mode of serves both the interpellating outcome of text as entertainment, and text as pedagogic regime.

The use of low modality enables the presentation of informational and serious societal issues in a form that does not alarm its audience. This is in contrast to high modality "reality" genres such as news, current affairs and documentary, which research has shown do alarm young audiences.

While a cartoon may be considered as low status TV, the voices used for the animated characters in the 1991 series include 'Hollywood names' such as Whoopi Goldberg as Gaia, Danny Glover, Dean Stockwell, Martin Sheen, Meg Ryan. This implies the text contains higher social value than a conventional cartoon.

Controversial Captain Planet and the Planeteers has been described as "the politically correct but very frightening cartoon show on ABC-TV. It has admirable sentiments - saving the planet, a racially balanced group of characters - but the message has that blunt, vacant, voidoid, puppet ring to it. . . it's propaganda, it smacks of trying to program children" (Philip Brophy, RMIT quoted in "Kaboom!" The Australian Magazine, Oct 8-9, 1994). While Brophy's intention is to denigrate the text by use of the label "propaganda", in Hartley's (1992) view the label

propaganda is not necessarily negative. He argues that progressively propaganda is dialogic, that it directs the reader's attention beyond the text. Explaining this Hartley says:

> Propaganda aligns the reader to the present and the future, towards action yet to occur. News and realist fiction position the reader as a judgemental impartial, omniscient, voyeuristic spectator; propaganda orients the reader towards engagement or participation in an action. . . . Propaganda does not seek to to produce in its readers a recognition of an abstract, unauthored truth. It seeks first and foremost to produce recognition of a relationship between the addresser and the addressee, a relationship ideally of faith, allegiance, loyalty to the cause: old-style truth. . . . Propaganda is able to exploit the postmodernist repertoires of signification, rhetoric, pleasure and celebratory self-awareness; its skills are devoted to presenting its techniques not as 'not there', but as *here*. (p. 53)

Captain Planet's generically positions as propaganda. This links to its formationally strategy to actively engage its young audience in a thought provoking, rhetorical futures debate and highlights it as a pedagogic regime.

Captain Planet is a half hour animated cartoon series drawing on the narrative and iconographic signifying conventions of 'super hero' cartoons. The majority of the text half hour concerns a fictional story. The last few moments conveys the pedagogic messages. This is in the form of two "Planet Alert" segments which directly address the audience to key issues in the story, and suggests ways to apply knowledge to improve the environmental health of the planet. The use of this strategy highlights the ways this text, in structuring a propaganda regime, straddles both of Hartley's (1992) generic boundaries infotainment and entertainment.

Narrative Focus: Modern or New Paradigm Framings?

Nine programs from the 1991 series, broadcast in 1994, are analysed in terms of their geographic and cultural setting, narrative framing and the rhetorical content of the 'serious' textual component called "Planetary Alert". Science discourse is significant in framing the narratives, but it is not placed at the top of a hierarchical discursive positioning. The following summaries shows the setting, narrative and eco-messages' included in nine episodes from the 1991 series.

TABLE 5. Setting and Narrative Synopsis of Captain Planet.

Episode 1. "Bitter Waters" (1991)

Setting: Pueblo American Indian Reservation and Russia.
Narrative: Despite a tribal elder predicting disaster, Lutton Plunder persuades the chairman of Indian Reservation Council to sign a contract allowing Plunder and side-kick Bleak to provide irrigation of their desert lands to farm rice and cotton. He will pay them rent and he gives them employment and cash crops in return. The project is an ecological disaster. Returning from the chaos of economic disaster in Russia, the Planeteers become involved. (Further detail is included in specific analysis of this episode later.

"Planet Alert" 1. "We often think of water as something that comes out of a tap whenever we want. but clean drinkable water is a precious resource. To conserve water don't let the hose run while washing your car. If you live in a dry climate use plants that don't need a lot of watering. That way when you turn on a tap you'll always know there is water for you. The power is YOURS!"

"Planet Alert" 2. "Water is one of earth's most precious resources. Don't let wasteful habits steal your water supply. Don't leave faucets running needlessly. Shut them tight and repair leaks fast. Use low flow shower heads. Recycling saves water too. Every ton of recycled paper saves seven thousand gallons of water. Help us make sure there is enough water for everyone. The power is YOURS!"

Episode 2."Domes of Doom"(1991)

Setting: Brazil. and Greece.
Narrative: Disguised as a benign politician, Lutton Plunder signs international governmental agreement to manage the earth's forest. His scheme is to cover the forests with giant domes. Into these domes highly polluted air is pumped from cities to be purified by the forests and pumped back to the cities. The cities' governments are charged extortionist prices for the 'service'. The plan is thwarted by the combined power of Captain Planet and the Planeteers.

Planet Alert 1. "Forests and plants are the airconditioners of our planet. They help regulate temperature and humidity as well as keep the air clean. So plant a tree or start a garden in your back yard. Or grow potted plants in your house. All it takes is a little work, sunlight and water. The power is YOURS!"

"Planet Alert" 2. "The earth needs more trees and we can plant new ones and we can protect the trees we already have. It take seventeen tall trees to make one ton of paper. Put it this way, when you recycle one ton of paper, you make sure seventeen trees remain standing. So recycle and help save our forests. The powers is YOURS."

Episode 3. "Mind Pollution"(1991)

Setting: Washington U.S.A.
Narrative: Linka visits a cousin also from Russia who lives in Washington. Because he has had trouble 'fitting' into his new community he falls prey to the evil "Scrum" a "Bliss" drug dealer. The youth of Washington all become dependent on Scum and Bliss turning them into 'zombies' who will do anything for a fix. The Planeteers are unable to deal with and need a lot of help from Captain Planet to solve this one.

"Planet Alert" 1. "Some drugs are good for you, but many can be harmful. Only use ones given to you by your doctor or your parents. These can keep you healthy. Illegal drugs are dangerous and can damage your mind as well as your heart, your lungs, our whole body. It is only a fool who thinks drugs are cool. If you've got a drug problem get help - you can choose not to take drugs. The power is YOURS!"

"Planet Alert" 2. "The health of our planet relies on the health of its people. To reach the highest heights and win the fight to save our planet we must have strength, endurance and courage. Our minds and our bodies must be in shape. The power is YOURS."

Episode 4. "Send in the Clones."(1991)

Setting: Thailand or Vietnam.
Narrative: Plunder needs workers for his flame throwing factory. A young girl wishes to become an ecologist, but her family only believes in educating boys. After cloning a locust, Dr Blight, mad female scientist clones the brother of the ambitious young girl to provide factory workers. Over population and a locust plague cause disaster. Aided by the sister's ecological knowledge, the Planeteers and Captain Planet save the day and reverse the process.

"Planet Alert" 1. "Children are important to everyone. Whether your family has sons or daughters, they should be equally proud. Remember the earth's resources are limited. you do not need a big family because all of the world's people are your brother and sisters. The power if YOURS."

"Planet Alert" 2. "Did you know the population of the planet is now more than five million, and it is increasing 90 million each year. But the earth is not getting bigger. So when it is your turn to have a family - keep it small. The more people there are the more pressure we put on our planet. So take it easy on our planet and conserve what you can. The power is YOURS."

Episode 5. "The Ark."(1991)

Setting: The Indian Subcontinent.
Narrative: Aided by Dr Blight, "Hoggish Greedly" builds "Hog Heaven golf course". Villagers have been paid a big advance to allow him to clear land threatening the remaining tiger habitat, on the basis that endangered tigers do not pay for schools and hospitals. Planeteers and a girl from the village are kidnapped by an 'alien' space collector of near extinct species and placed in a holographic "ark" landscape, because the alien considers humans an endangered species. Gaia herself is needed to rescue the Planeteers and stop the golf course development with the help Captain Planet.

"Planet Alert"1. "Zoos are one way of preserving endangered species, but the best way is to protect the habitat where these animals live. Even our homes are built in wild animals' territory. So if you want your home to be a sanctuary, leave an area uncut. Trees and brush provide food and shelter for animals such as birds and foxes. By building a blind you can watch them, but if they are wild they can be dangerous. We can live in peace with all the world's creatures. The power is YOURS!"

"Planet Alert" 2. I am Captain Planet and we are the Planeteers. You can be a planeteer too by helping to make our world a better place to live for everyone who shares our planet - including our wildlife friends like Sneezer - who are being killed to make jewelry, souvenirs, fur coats. So tell your friends not to buy things that require an animal to give its life. We must not plunder our planet. The power is YOURS!"

Episode 6. "The Predator". (1991)

Setting: Coastal town USA.
Narrative: "Bleak" offers to exterminate sharks after rumour of an enormous shark drives people from swimming. The consequence of shark slaughter is sea wasps which come in plague proportions. No one can go into the sea, and tourism is affected. Planeteers, Captain Planet and Gaia sort it all out. Gaia explains predators role in balancing populations in an environment.

"Planet Alert" 1. "The earth is home to thousands of plants and animal species and that includes sharks, and like all predators they can be dangerous. but they also help to keep our land and oceans healthy. So to keep yourself healthy get out of the water when there are sharks around. And don't panic, thrashing motions attract sharks. Blood attracts sharks, don't go swimming if you have an open wound. The power is YOURS!"

"Planet Alert" 2. "Today many people are careless with things that belong to us all - like our oceans where greedy fishermen needlessly kill thousands of animals including turtles , birds and dolphins along with their catch. And they are threatening the jobs of those fishermen who do the job properly. The oceans need our help. If we don't protect it today, it won't be here tomorrow. The power is YOURS!"

Episode 7. "Isle of Solar Energy".

Setting: South America.
Narrative: Dr Paulo, an inventor, and daughter live on an island powered by a solar power plant. Dr Nuclear and offsider Zed Loot use the solar power station to make a death-ray of lethal gamma rays. Captain Planet and Planeteers come to the rescue.

"Planet Alert" 1. "The sun is our greatest source of natural energy. Some day we may use sunlight to power everything. On a cold day open your curtains and let the sun's heat in. And on hot days block out heat and use your airconditioner less. The technology is here - we can build solar panels, solar heaters, even solar cars. The more we shift to solar power the healthier our planet will be. The power is YOURS!"

"Planet Alert" 2. "We all take energy for granted but power has its price. Think about it when you turn on your lights or stereo - you're using up energy. But you are also using up earth's resources and contributing to pollution. We need energy but we also need to use it wisely. Don't waste it. Turn off the lights and TV when you are not in the room. The little things you do could make a big difference for our planet. The power to save power is YOURS!"

Episode 8. "The Coral Killer". (1991)

Setting: Coral island fishing communities S.E. Asia.
Narrative: Islanders are having trouble catching enough fish and shells to sell to make a living. Hog Greedly detonates the reef. Greedly collects the coral to sell. Villagers reap many fish and shells. Planeteers question the sustainability of this method. "Maybe you can worry about tomorrow rich girl, but we have to worry about today". The reefs are destroyed, there is no fish. Planeteers fail to win over villagers. Enormous waves destroy a village once protected by the reef. Villagers see sense and invest rather in eco-tourism, an industry that doesn't destroy the reef and is sustainable.

"Planet Alert" 1. "Fish farms are a way to harvest the oceans sustainably. Aquaculture provides both food and employment. Many kinds of fish can be raised here. so people can catch fish without harming the reef. The power is YOURS!"

"Planet Alert" 2. "The future of earth rested in all our hands. Please don't waste water. Please do not waste energy. Please do not waste your minds and bodies. Please don't waste our future. The power is YOURS!"

Episode 9: "If its Doomsday, This Must be Belfast".(1991).

Setting: Belfast, The West Bank - Palestine/Israel; and South Africa.
Narrative: "Verminous Scum" and "Rod Nucem" hide three nuclear bombs in three different parts of the world - Belfast, Jerusalem, and South Africa. They argue "humans are so full of petty hatred they'll annihilate each other." Trigger devices are given to two people representing each side of the three trouble spots. Gaia sends the Planeteers to thwart disaster from these places where "hatred is stronger than logic." The narrative discusses the interweaving of historical, social, economic, and political factors. Captain Planet is unable to help with a nuclear bomb so Gaia creates a time warp ten years into the future for the participants to see the futility of fighting. They see demolished landscapes and a nuclear winter. They all agree to about the futility of fighting and to keep their battles to the political arena.

"Planet Alert" 1. "Sometimes people hate or fear other who are different than they are. But that's wrong. People of different races can get along. As can people from different cultures. Or those who practice different religions. Don't judge somebody just because they look or act differently. We must learn to accept and understand each other for what we are. It's up to us to stamp out hatred. The power is YOURS!"

"Planet Alert" 2. "Our world can be a place of peace or a battle. Peace begins at home - even your school yard can be a place for friendship or a place for making enemies. Fighting isn't about being brave, it's about being dumb. Why fight when its smarter to make friends. That's the way everybody wins. The power is YOURS!"

Settings: Modern or New Paradigm Framing?

The settings for the stories are spread across the planet. No location dominates except for Gaia's mythological 'shanghri-la' island. Voices are heard from third world communities as well as the first and second world. Rural communities are represented alongside cities. These diverse settings set environmental issues as a global concern for everyone on the planet. No community, however isolated is independent. This global setting promotes Henderson's (1991) holistic principle of interconnectedness. It also promotes the holistic principle of heterarchy. The answers and problems are not the prerogative of the technologically advanced or subsistence communities. Global perspectives promote the shared nature of environmental reality for all communities.

Temporally the settings signify both the present and the future. This strategy links with science fiction film. This device of temporal displacement enables the text to structure meanings that critically engage with contemporary societal concerns with science and technology choices.

Characters: Modern or New Paradigm Framing?

The narratives include an interweaving of situations concerning different ecological, economic, political and cultural values. The key characters are the Planeteers representing the five continents: Kwame from Africa, Wheeler from U.S.A, Linka from the Soviet, Gi from Asia, and Mati from South America; Captain Planet, representing their combined power; Gaia, who describes herself in a 1993 episode as an "archetypal planetary figure"; and a team of "polluting perpetrators" including Lutton Plunder, Bleak his offsider, Dr Blight (mad female scientist), Hoggish Greedly (developer), Verminous Scum (evil dealer in drugs and toxic pollution), and Rod Nucem (a toxic fiend). These characters rhetorically signify architypes. The 'good' characters apply good ecological sense-making on the side of the planet, and ultimately overcome the archetypal polluting and greedy evil 'bad' first world perpetrators who ignore ecological reality.

These characters promote heterarchical power to all those on the side of Gaia and the planet. This heterarchical power, attributed to representatives of the five continents, and linked to the heterarchical representation of various locations, setting and cultures of the narratives, breakdown and reframes the conventional modernist binary devices of constructing the "other". This reframes the dominant discursive framing of modernist Western discourse. The critical works of Said (1978, 1993) link these conventional marginalizing practices to the Eurocentric culture of modernism underpinned by the modern paradigms of science. The use of Gaia as ultimate female goddess extends this to reframe the conventional Eurocentric masculine gendering of authority and divinity, associated with modernist patriarchy.

Narratives: Scientific Lesson.

Each narrative informs the young audience about the various complexities of holistic ecological thinking. These episodes focus on these topics:

Episode 1: The fragility of desert environments and the link between employment and sustainable environmental practice.
Episode 2: The role of forests in air purification.
Episode 3: The link between drug taking and social alienation.
Episode 4: The dangers of genetic engineering.
Episode 5: The link between endangered species or species extinction and habitat destruction.
Episode 6: The significant role of predators (e.g. sharks and foxes) in the maintenance of an ecological balance.
Episode 7: Even the most apparently benign technology such as solar power has destructive potential.
Episode 8: The fragility of coral reefs, their environmental function and the need for sustainable aquaculture to protect both the environment and the communities that live by it.
Episode 9: The futility of military solutions to power struggles between peoples, the finality of nuclear arms and the processes for peace.

These diverse narratives link with some told in Quantum, Beyond 2000, and Totally Wild. The story titled "Bitter Waters" is analysed further.

Episode "Bitter Waters": Scientific Framework - Modern or New Paradigm Characteristics?

Episode 1. "Bitter Waters" (1991)

Setting: Pueblo American Indian Reservation and Russia.
Narrative: Despite a tribal elder predicting disaster, Lutton Plunder persuades the chairman of Indian Reservation Council to sign a contract allowing Plunder and side-kick Bleak to provide irrigation of their desert lands to farm rice and cotton. He will pay them rent and he gives them employment and cash crops in return. The project is an ecological disaster. Returning from the chaos of economic disaster in Russia, the Planeteers become involved. (Further detail is included in specific analysis of this episode later.)

This story is structured on a rhetorical binary of modern versus new paradigm science argument. The knowledge contained is sourced from the geophysical sciences and ecology. New paradigm science triumphs in the end. Lutton Plunder, motivated by greed and profit, attempts to employ modern paradigm informed science to an agriculture project. Ignoring nature's delicate balance, he celebrates his capacity to dominate nature through technology ,and by the use of irrigation with waters drawn from aquifers beneath the desert.

This project leaches selenium and other mineral salts from the earth into the water streams, resulting in the deaths of animal species dependent on the water supplies for life. Increases in mineral salts results in the pollution of the reservations wells used for human

consumption. Human illness results. The massive pumping of underground water needed to maintain the irrigation for the crops results in earthquake-like subsidence due to the vacuum created. This story informs of the real-life issues involved in the adult world of environmental management.

Applying Capra's scientific framework it is clear that Plunder is operating on the modern science paradigm. The success of his project is underpinned by modern paradigm characteristic focus on the part, not the whole ecosystem, promoting the utilitarian value of his built structure, not the natural processes. His scheme is modelled on only one part of the eco-reality - the supply of water. He is only concerned with building the structure to enable this - a huge pumping station, irrigation channels etc. His reductive focus is modelled on the assumption of certainty. This reductive certainty, or 'truth', comes through a belief in the control of variables that enables a production cycle to provide himself with large profits.

In contrast a wise old Indian, who has seen five generations in his lifetime, and Gaia, represent the whole new paradigm informed reality - the interweaving of physical landscape, elements, time, and life forms, that holistically constructs the ecological processes that makes the balance in the desert environment. These multiplicity of factors structure an interwoven network similar to Capra's identification of new paradigm scientific characteristics as emphasising the whole; processes; and epistemic science; served by the metaphor of network; with knowledge framed as approximate descriptions. The wise old Indian's understanding shares significant commonality with new paradigm scientific understanding.

Holistic Framework: Modern or New Paradigm Principles?

The text promotes several of Henderson's (1991) holistic post-Cartesian principles, in not only in terms of the scientific rhetoric, but also informs the economic, and social models. The landscape is represented as complex and interconnected. This principle of interconnectivity is also narratively signalled as interweaving economic and social factors in the outcome of economic sustainability through employment. The plot focuses on the effects of one factor in the environment, and so promotes the principle of redistribution. Through linking rainfall to aquifers and water from wells in the desert, the text points to the recycling of the elements fundamental to holistic systemic balance.

Plunder's strategy constructs a zero sum game - with him the only winner. However the final solution with the Indians farming quayule rubber, a plant suited to the desert conditions, identifies the holistic principle of complimentarity with meta-logics of win-win for all environmentally, economically, socially and culturally. The hierarchical social position afforded Grey Eagle links to his acknowledging his longevity in giving him wisdom. The experience of history is promoted. The central role of Grey Eagle, with his five generation recollections of desert

reality, a practical sense of living history, identifies recognition of the holistic principles of uncertainty and change as being fundamental.

The story interconnects realities on the Pueblo Indian Reservation with those in Russia. One of the planeteers is distressed by the suffering and unhappiness caused by the humiliation of her people not having jobs, spending power or anything to buy in the shops caused by the economic chaos of the then collapsing Soviet Empire. This strategy of interconnecting geocultural realities highlights how with interconnected global realities no system is protected from chaotic uncertainties. The example of Russia signifies how a closed modern paradigm framed system of government is likely to be less prepared for chaos and uncertainty, and therefore traumatic change is inevitable.

This narrative also links to B. Jones' (1993) thesis that pre-modern cosmology, as represented by the world view of the old Indian, articulates commonality with new paradigm cosmology. The Indian spiritual link with the environment is underscored by understanding the organic, holistic and ecological nature of reality. The cultural outcome of this shifts the dominant point of view away from human perspective.

"Planet Alert" Rhetoric.

"Planet Alert" 1: "We often think of water as something that comes out of a tap whenever we want. but clean drinkable water is a precious resource. To conserve water don't let the hose run while washing your car. If you live in a dry climate use plants that don't need a lot of watering. That way when you turn on a tap you'll always know there is water for you. The power is YOURS!"

"Planet Alert" 2: "Water is one of earth's most precious resources. Don't let wasteful habits steal your water supply. Don't leave faucets running needlessly. Shut them tight and repair leaks fast. Use low flow shower heads. Recycling saves water too. Every ton of recycled paper saves seven thousand gallons of water. Help us make sure there is enough water for everyone. The power is YOURS!"

The principles promoted in the two "Planetary Alert" pedagogic segments empowers and promotes the audience to actively engage with the applying holistic knowledge to their own communities. This promotes the holistic heterarchical principle, where value is placed on the interconnectedness of all components parts in achieving sustainability of practices. This strategy links with the early 1970's feminist catchcry used by radical social movements - "the personal is political". This rhetorical slogan highlights the limitation of the binary argument, which falsely divides the public and private spheres of life.

Ecological Framework: Modern or New Paradigm Values?

Along with the binary good versus evil structure to the narrative, so too the ecological values reflect a binary divide. Plunder's action and beliefs egocentric values fundamental to capitalism and the mechanistic world view. Red Sun, the chairman of the Indian council, and

Linka, the girl from Russia, with her predominant concerns for people's rights to employment, presents homocentric values, i.e those attitudes to the environment that are grounded in social good. In contrast the lesson learnt by the other characters promote the ecocentric values of Gaia and Grey Eagle, whose visions embrace values grounded in the nature of the cosmos. The narrative closure promotes holistic ecocentric values as providing sustainable solutions. The text constructs significant preferred ecocultural meanings.

As a pedagogic project this narrative representation of the three ecological ethical positions constructs a powerful teaching medium. The story communicates to its audience the practical outcomes of the three points of view and closes in favour of new paradigm ecocentric cultural values. This closed strategy also identifies its regime as propaganda. The episode demonstrates Hartley's (1992 p. 53) argument that "propaganda is able to exploit postmodernist repertoires of signification, rhetoric, pleasure and celebratory self-awareness, its skills are devoted to presenting its techniques as 'not there', but as *here*."

Conclusions

This animated childrens cartoon represents low status television. However it promotes, according to all three frameworks, preferred new paradigm ideology. Its pedagogic agenda aims to inform, entertain, be playful, and give pleasure to its young audience. In constructing it dominant ecoculturalist meanings. Brophy's (1994) criticism of the texts political correctness, colloquially referred to a "PC" may rather signify "PC" for post-Cartesian.

As propaganda, this text links to a radical cultural agenda to sow the seed of a new futures cultural meta-narrative promoting new paradigm ecological cosmology. Textual focus on indigenous peoples in the narratives is pertinent. In line with discussion on an emerging ecologically based theological global mythological meta-narrative, it has been argued by anthropologists and theologists ("Meridian" ABC Radio National, 23 rd April, 1995) that the sustainability of these people can be likened to the role of "the canary in the coal mine". Their reality is a warning to the sustainability of all societies.

For Campbell (1998, p. 31) myth basically serves four functions. These he says are the mystical function - "realising what a wonder the universe is, and what a wonder you are, and experiencing awe before this mystery." The second is a cosmological dimension, the dimension with which science is concerned - "showing you what the shape of the universe is, but showing you in such a way that the mystery comes through. " Of this he says "today we tend think that scientists have all the answers. but the great ones tell us, no, we haven't got all the answers". The third function is the sociological one - "supporting and validating a certain social order". Finally the fourth he argues, is a pedagogic function of how to live a human lifetime under any circumstances:

"Myths can teach you that." In this way Captain Planet attempts to promote ecocultural mythology.

Discussing this text with children in the "Ed Magazine - Ed Reckons" feature in the Western Australian newspaper (April 4, 1995), the anonymous author says:

> I want to make a complaint. This program is supposed to alert us to the dangers facing our environment, but it is not looney orange monsters who are causing our problems. In real life the bad guys are more likely to wear business suits, nice shoes and ties. They will probably drive swish cars and live in luxury homes. They will certainly be admired because they are wealthy and powerful. Hey! These guys aren't green, but they're greedy! They haven't got zapping fingers, but they know how to get things done. They destroy the environment to save or make a dollar. Simple as that! (p. 6)

Using archetypal good and bad characters in a mythological framework allows the proliferation of radical new paradigm thinking and discussion of diverse socio-political and cultural values that link to this. These strategies, inform about science, and cosmology, and discuss the benefits and costs of various societal economic, social and environmental values. It does so in a manner that is not threatening to its audience. As pedagogic low modality 'reality' programming it gives pleasure and while promoting its serious agenda, it is simultaneously entertaining, humorous and light hearted. It represents a radical effort to communicate different ecoculturalist values in sharp contrast to the plentitude of entertainment with the dominant ideology of capitalistic atheistic materialism that frames children's TV.

Science on TV: Textual Analysis - Regimes of Fiction.

6.3 The X-Files. (1994), Executive Producer: Chris Carter. Ten Thirteen Productions in Association with 20th Century Film Fox Corporation.

Formations: Modern or New paradigm Imaginings?

Series creator Chris Carter developed The X-Files as a 1990's version of the popular 1960's science fiction series Twilight Zone, and Night Stalker. In Australia the hour long program is shown at 8.30 pm on The Ten Network. The series is distributed by 20th Century Fox Film Corp. It has an 'M' rating based on mature audience material. Previews highlight the stylistic signification of suspense, mystery, and drama drawn from the conventions of both the horror and science fiction genres. These clearly signal to the audience the kind of entertaining challenges structured in the textual meanings.

Building on this science fiction convention, the series combines this with paranormal mystery and crime-busting narratives, to interpellate an audience for the very popular award wining text. It has not only become very popular on television, but has also gathered cult-like following on the Internet. It has spawned a variety of merchandising in the U.S.A., which has grown with the increasing popularity of the text. Delphi, an Internet services co: ration uses its The X-File on-line services and Usenet X-Files forum to attract customers to sign up for its services offering the first five hours free. (Wired Magazine, December, 1994, p. 109). This alternate media technology site identifies its effectivity in attracting a sub-cultural audience.

This text's conventional use of science fiction and horror film strategies, links to cultural expression of the sub-cultural groups associated with the new culture of 'cyberspace', and computer technology. This strategy identifies an agenda to interpellate an audience aware of the specific signifying practices of the genres. The text links with rising popular cultural expression of the ideology of sub-cultural groups labelled variously as 'cyberpunks', 'neo' or 'techno paganists' or 'techno shamanists', many of whom find voice on the new media technology site - the Internet. According to cultural critic Rushkoff (1994), new paradigm science thinking is an important contributory framework informing the ideology of the sub-cultural groups that inhabit cyberspace.

The agenda of The X-Files is to develop a commercial and entertaining text focussed on re-working a previously successful television science fiction genre. Kuhn (1991, p. 5) describes the characteristics of science fiction as repeated themes exploring the conflict between science and technology, and human nature. This narrative focus is structured through temporal and spacial displacement, and the foregrounding of unfamiliar technologies and futuristic devices. Drawing on this convention does not consciously identify any specific agenda setting sympathies with either

paradigms of science. It does however identify a science and technology discourse as positioned high on the texts hierarchy of discourses.

Borrowing from the horror film genre, its genre bending formation explores what is described as the 'paranormal' - the shifting boundaries on the margins of science, rational and intuitional explanation, and human nature. This genre bending focus on the irrational, the inexplicable, along side a science discourse identifies critical engagement with the methodology and the answers of science. Science is unable to rationally explain all the narrative mysteries. The spiritual and metaphysical ideology of some of these sub-cultural groups links to common values held by pre-modern and new paradigm thinking.

Glover (1993) identifies the generic tradition of horror as often structuring a binary "white science" versus "black magic" argument. White science, she says, "refers to the Western rational tradition, its tools are surgery, drugs, psychotherapy and other forms of hegemonic science. Black magic on the other hand refers to satanism, voodoo, spiritualism and folk variants of Roman Catholicism" (p. 66). Exploring these subject areas, the text's narrative make the link between anomalies and the necessity for a paradigm shift. Through focus on the periferal boundaries of the acceptability of ideas, the narratives explore alternate visions of reality, and different 'scientific' and 'non-scientific' tools for sense-making. The text's agenda links to to explore of the conventional rationales and marginal strategies behind this binary mapping of cultural territory.

Modes of Production: Modern or New Paradigm Framing?

The X-Files is filmed as social realist fiction. In constructing its realist modes, the producers set stories in varied locations, and construct diverse backgrounds to develop the characters acting, reacting, and interacting through mysterious narrative circumstances. The viewer is positioned as participant spectator actively engaged with solving the mystery in partnership with the key characters. Fiske (1987), in discussing the characteristics of the form of realism says:

> Realism does not just reproduce reality - it makes sense of it - the essence of realism is that it reproduces reality in such a form as to make it easily understandable. It does this primarily by ensuring that all links and relationships between its elements are clear and logical, that the narrative follows the basis laws of cause and effect, and that every element is there for the purpose of helping to make sense: nothing is extraneous or accidental (p. 24).

Fiske's discussion is underpinned by a modern paradigm framed construction of reality. His rhetoric names a linear and logical, deterministic cause and effect path to structure sense-making. New Paradigm realism is not always clear and logical, complexity highlights the fundamental extraneous and accidental nature of cause and effect. The X-Files is full of extraneous and accidental obstacles to narrative flow. Narratives do not always make sense, or have answers. The rhetorical mode constructs an interpellating strategy where the pleasure derived from the unpredictable

process of viewing, rather than the predictability of narrative outcomes, which do not always close.

Modes of Address: Modern or New Paradigm Framings?

The X-Files structures a complex mix of genre bending entertainment television. The series engages with the concerns of science fiction. and crime solving detective work in a interlinked multidiscursive framework of dramatic serialisation. Intricate narrative plot-lines structure the weekly program. These narratives interweave with ongoing serial concerns around the nature of scientific power, the frontiers of scientific research, conspiratorial theories on the role of the military and secret service, the paranormal, and wider interconnected personal, moral and ethical issues for the two heroes, FBI Agents, Mulder and Scully. These narratives, while celebrating the mystery solving capacity of science, critique the uses and limitations of scientific knowledge. Resisting narrative closure is the strategic device that enables this. Science is the dominant problem solving tool, but it does not always have the answers.

This open narrative strategy, and diverse subject focus on the paranormal, shows the possibility of alternative theoretical models impacting on reality itself. This idea links with theories in science such as the Heisenberg Principle of Quantum Physics or 'observer effect'. This principle identifies the ways in which the observer and the observed are irrevocably interlinked. This focus critically highlights as problematic the whole concept of objectivity central to modern paradigm science.

The interweaving of information, both factual and fictional, into the complex narrative shifts the pleasure away from the causality of the mystery. While utilising reductive science as the common deductive tool, these strategies point to a representational framework that acknowledges both the complexity and unmapped challenges of the wider horizon of new paradigm informed insights.

The series draws on conventional techniques from film noir, science fiction, and the horror genre. Camera positions often structure a voyeuristic spectatorial point of view for audience. Camera angles break with conventional view lines. Lighting is low, subjects are back lit or under spot lights with black back settings. These all construct visual suspense and uncertainty, and shift from the hegemonic discursive position.

This shifting point of view is audibly supported by strange sounds and music signifying suspense and mystery, as used by David Lynch in the televisual series Twin Peaks. The soundtrack signifies the horrendous, frightening and violent world beneath the surface of conservative, middle class, American small town, or urban reality. These techniques, while probing the paranormal, also focus on the susceptibility of the human mind to the 'irrational'. This is articulated through the

effects of violent, psychic, emotional states and bio-chemical stimulation to frame various constructions of reality in characters. The rhetoric explores the various environmental, biological, genetic or paranormal arguments that determine human behaviour.

The two main characters, agents Mulder and Scully, are both trained in, and have specialist working knowledge of, the theory, practices and technology of science. The script enables the display of this as they deduce their ways through the unknown using the latest technological tools. Mulder often explains and informs the audience about science understandings through dialogue with other characters. The various other characters that come and go, and drive specific plots are drawn from the functional middle class, the poor, the rich, the insane, the criminal, the spiritual and the mystical. The characters structure a diverse complex vision of the peoples of the United States of America as scientific and technological society.

The use of the same title "The Truth is Out There" highlights science and justice's preoccupation with the affirmation of truth. However the diversity of narrative subjects, the representational strategies and structural strategies that present both closed and open ended narratives, all point to the constructedness of 'truths' depending on the day's agenda. The strategy of linking deductive factors to solve crimes across scientific, economic and cultural arena points to the complexity of effects and causation. The linking of narrative concerns with openendedness all point to uncertainty - uncertainly of outcomes, consequences, and of knowledge.

Narrative attention to scientific detective work focusing on the anomalous, places high value on the driving forces of scientific understanding and knowledge from the margins and boundaries of acceptability. Contextualizing these stories within the Federal Investigations Bureau links the working of scientific achievement with the military, government and industry institutional power. Mulder and other characters euloguise the role of ethical 'whistle blowing', and critique the power abuse associated with the dark side of scientific developments. This raises wider political concerns for a democratic society.

These 'fictional' strategies all position science in the wider socio-political economic and cultural context. These complex fictional modes of address celebrate the ideology of the new paradigm. This mode of address articulates the cultural impact of the radical shift in scientific thinking from reductive, linear and fragmented certainty and 'truth', to the perceived disempowering 'horror' of living with chaos, complexity, uncertainty and the inevitability of change underpinning the new paradigm. Further discourse analysis reveals how this is structured, and how new paradigm thinking is promoted across scientific, holistic and ecological frameworks.

Narratives: Modern or New Paradigm Frameworks?

The narrative of eight episodes were examined. Disappointingly the Ten Network appeared to show some episodes out of order, making it difficult for the audience to follow the on-going plot about corruption at the top. However this might excite an audience drawn to new paradigm framed non-linear sequencing to construct chaotic models of reality.

Episode 1.

Title: *The Truth is Out There.* (1994)

Setting: Verianco county.

Plot 1. A small regional city surrounded by apple and cherry farms experiences a sky rocketing homicide rate. Each incident occurred in a public place. The perpetrators are all good functional middle class citizens. Agent Mulder of the FBI is assigned to solve this atypical crime spree. With the help of his forensic pathologist partner, Dana Scully, his investigation links vandalised video or digital display units at the scene of the crime with official, but clandestine, experimental chemical spraying of the Eurasian cluster fly to protect the apple and cherry driven local economy. The effects of this spray cause heightened paranoid fear response, triggering the violent crimes.

Episode 2.

Title: *The Truth is Out There.* (1994)

Setting: New York.

Plot 1. After a 900 fire call, Dr, Grissen, founder of a sleep disorder clinic is found dead. There is no evidence of fire but the victim's body displays the outcomes of exposure to extreme temperatures. In agent Scully's words: "it's as if his body believed it was burning." Mulder unweaves the links between the sleep disorder doctor and military experimentation carried out with Vietnam marines 24 years previously. This project involved the creation of the "ultimate soldier" through the eradication of the need for sleep to win the war. The unforeseen consequent is the capacity to kill with telepathic images.

Plot 2. Previously the X-files have been closed in an attempt to curb Mulder's investigative work. Mulder trusts no one and insists on working alone. However he is assigned a new partner called Kryczech who he works with, but suspects of being an informer to those who closed the X-Files. A mystery informant gives Mulder a secret report on the above case, and a warning about those who want him silenced permanently. Mulder faxes Scully a copy of the report. His copy disappears.

Episode 3.

Title: *Deny Everything.* (1994)

Setting: Washington D.C.

Plot 1. Scully's copy of the informant's report disappears. The intrigue links to power from above and the closing of the X-files. The work of Mulder and Scully is getting too close to the 'dark' cavities of the government and the military. Agent Kryczech is informing on Mulder. Supporting Mulder, his superior Skinner agrees to fight by doing what "they" fear most - re-opening the X-Files.

Plot 2. This is interwoven with the ongoing plot. Scully rings to inform Mulder that she has found a mysterious piece of metal in Dwane Berry, which appeared to be a serial number coding him. Her call is broken by sounds of a scuffle and her cries for help. Mulder gets to her flat to find chaos, blood and Scully gone. Mulder connects her disappearance to the issues above. Dwane Berry has kidnapped her, believing he has to deliver her to "aliens". Mulder has trouble trying to rescue her and fails.

Episode 4.

Title: *The Truth is Out There.* (1994)

Setting: Los Angeles.

Plot 1. The X-Files is opened up after being closed from May to November. Scully's file is included.

Plot 2. While there are fires in the hills behind Los Angeles, a successful businessman is seduced by a young woman. Lust turns to a violent blood sucking death carried out by the woman and three other male perpetrators. The L.A. Police Dept. think they can handle it - they are used to "wacko" crimes in their town. However Mulder gets the file as the crime scene "M.O." links to similar deaths of 6 people in 2 other states. Mulder works alone. He searches blood bank employees, pursuing people who claim to be vampires endowed with eternal life through drinking blood. They operate a night to avoid sunlight which kills them by burning them. Mulder employs his both scientific and cultural mythology knowledge to solve this one. However all four "vampires" end up burnt to death in a fire.

Episode 5.

Title: *The Truth is Out There.* (1994)

Setting: Medical Centre.

Plot 1. Scully is still missing. Her mother and Mulder are not ready to give up and accept she is dead, despite holding a plaque which says: "Dana Scully,1964-94, loving daughter and friend", with the inscription: "The spirit is the truth. 1 John 5:09". Mysteriously she turns up comatosed in a critical condition. Doctors are unable to diagnose the cause of her condition. Scully's 'new age' sister believes she is choosing whether to live or die. The audience sees visual images of her subconscious battle between life and death framed around dialogue with her already dead father. With the help of forensic and three 'feral maverick' scientists who work with other underground scientific geniuses through the Internet, Mulder finds out that Scully is the victim of 'cutting edge' genetic engineering experiment - branch DNA, possibly sourced from aliens. They believe she will die.

Plot 2. Interwoven with the above plot, the mysterious African American informant appears again and warns Mulder of those who wish him and Scully gone. Mulder informs Skinner of Kryczech's connection with the intrigue. Skinner identifies the connection above to the "Cancer Man". Seeing the dark side of the pathway he must take to survive in the job, Mulder resigns. Skinner tears it up because he believes Mulder is invaluable to the service because of his capacity to go beyond the boundaries of science and confront the unknown; the paranormal mystery. Mulder goes to Scully rather than kill those who are sent to kill him. Scully later re-awakens magically with no negative side effects.

Episode 6. (Shown out of sequence.)
Title: *The Truth is Out There.* (1994)
Setting: Washington D.C.
Plot 1. Scully has a vivid dream about her father and is awoken by a call from her mother to say her father has suddenly died. A young university couple is kidnapped. This crime links to another couple kidnapped and tortured to death one year ago at Duke Uni. Mulder is called in because Luther Lee Boggs, due to go to the gas chamber on evidence of Mulder, claims knowledge on the kidnapping through psychic transmission. The two hero's character roles are reversed. Reversing their conventional positions on the paranormal, Mulder doesn't believe and Scully is susceptible because of the death of her father, and psychic experiences that link to this. Boggs 'vision' lead Scully to successfully find and release the girl. Mulder gets shot and is out of action. The boy is finally saved by Scully by working through the Boggs' psychic visions. Boggs is gased.

Plot 2. This plot interweaves with the ongoing debate centred on character development structuring Mulder as open to the possibility of psychic, mystic paranormal reality, and Scully as cynic and disbeliever looking for rational and scientific explanation.

Episode 7. (also shown out of sequence)
Title: *The Truth is Out There.* (1994)
Setting: Forestry Services Oregon.
Plot 1. There is an on-going ideological and physical battle between government forestry/timber workers and ecoterrorist - 'spikes'. Mysteriously a large number of forestry workers are killed. Ecoterrorists are suspected. Mulder and Scully take the job - to clear their heads of the stress of the job and take some fresh country air. They find some giant insect-like cocoons wrapped around a dead forestry worker. The mystery is solved by linking the cutting down of ancient trees and the release from within the tree of formally dormant micro organisms, which attack people at night. After much fear and intrepidation Scully and Mulder are the only ones to get out with the help of an ecoterrorist. The micro-organism is still out there.

Episode 8.
Title : *The truth is Out There.* (1994)

Setting: Delta Green Wisconsin.

Plot 1. In a small town in cattle raising country, after disappearing, a sixteen year old boy is found naked in the woods in a zombie-like state. On his back is written the words "he is one". Mulder takes the case because similar victims were found three towns away. Locals complain the town has become more violent in recent history. Located on the edge of town, a white robed, red turbaned vegetarian cult group, "The church of the red museum" is suspected of 'possessing' these kids. More victims become "she/he's one" zombies. A 'red herring' link is is made by Mulder and Scully between genetically engineered growth hormone in cattle. However Mulder reveals the kids are part of a 20 year secret experiment to inject them with "alien DNA" to effect their immunity system. They have never been sick. Who is behind these experiments is not revealed. The cult people assist in saving the children. The kids all get flu and return to 'normal'. The unidentified agent involved in covering the pathway to those responsible disappears.

Plot 2. This mystery links to the earlier mystery of the biological marking and branch DNA experiments in previous episodes.

Settings: modern or new paradigm frameworks?

Each scene opens with its location typed up on the screen along with the time. This presents the program as an official diary or report. This signifies both the seriousness of the task, and responsibility of the work, highlighting institutional practice. It signifies a record of accountability of work, and is part of the ritual of a precise, 'disciplined' scientific mind. The naming of time and location structures a sense of a 'factual' framework to the fiction. It encodes meanings of precision onto the science and methodology represented. This links with similar signifying strategies in Beyond 2000.

Stories are located across the United States in both cities, suburbs, country towns and rural landscapes. This strategy places the paranormal, the unknown or mysterious as occurring in various communities, both human and non-human across a country. This structures a sense of the communal and individual experience with mysterious and anomalous reality for a nation as a whole. At the same time this device foregrounds Mulder as superior mystery solving foot soldier in any environment.

Narratives: modern of new paradigm frameworks?

In infotainment science texts the narrative is often constructed as a 'detective' story. The X-Files fictional narratives display the potency of science and technology as a sophisticated tool for resolving complex mysteries within, and beyond the laboratory walls. At the same time this text draws critical focus on the problem solving capacity of a mind locked into paradigmatic certainty. This highlights the multidisciplinary knowledge required to engage with complexity. Mulder

often draws on cultural knowledge beyond science, such as in Episode 4 where he relies on his knowledge of the mythology of vampires.

Complex non-linear multiple plot lines focus on, and examine causality. and effects issues across complex interconnected boundaries of medical, social, psychological, economic, religious and ecological domains. This handling of complexity, supported by the deductive reasoning, and the most sophisticated forensic and pathological technological of science, is Mulder's unique skill. This representational of micro and macro reality, and the ways they interconnect, positions new paradigm thinking high in the hierarchy of discourses.

However despite Mulder's positioning as hero, he is fallible hero. He doesn't always find the answers he seeks. This strategy which denies narrative closure places emphasis on uncertainty. Even when a case is solved there are always questions left unanswered which again identifies the significance of uncertainty. The scientific mind framed by the new paradigm, despite the consolation provided by the affirmation of theory, must always be open to new possibilities.

This open-ended rhetorical strategy also drives the soap opera style of interconnected plots, which interweave through each episode. These plots address the intimate, personal and philosophical concerns of the two heroes, Mulder and Scully. This links to wider socio-political debate about the ethics and morality of institutions and individuals invested with the power of promoting research and development at the cutting edge of science. This multi-layering of plots and personal, individual, communal and institutional concerns, structures a complex more holistic representation of both the benevolent and dark side of science and authority.

Those characters represented in the various above narratives reflect diversity of social, economic and educational background. While white characters dominate, African Americans are represented as both institutional superiors, heroes, victims and villains. Plots are not driven by Mulder and Scully 'judging' the actions of others. Rather the characters present opportunity for the analytical mind to gain insight about the nature of reality. These strategies all cohere to structure a new paradigm informed framework. Further analysis of an episode identifies the ways this fictional text promotes the new paradigm, and what scientific characteristics, holistic principles and ecological values are included

Episode 8, The X-files: *The Truth is Out There*. (1994)

The story opens with workers in an abattoir. A woman leaves the meat works and returns home to her two children watching TV. She tells the eldest to ring for Pizza for tea while she has a shower. The mise-en-scene signifies a 'normal' domestic situation. However drawing on the Hitchcock horror tradition associated with women showering, the mood changes. The camera adopts a voyeuristic key hole in the wall. This is accompanied by the sound of heavy breathing.

The audience gets to see a blurred image of the perpetrator's eye and glasses frame through the key hole. The phone rings. The eldest boy tells his brother he will be out for half an hour.

In the next scene the mother is on the phone to the police panicking about her son who has been gone for four hours. This scene cuts to the boy running naked, terrified through the woods in the mist and half light. He runs into the sheriff. The camera pauses on his naked back and the words written in black pen, "he is one". The opening sequence begins. Typically this opening highlights a fictional shift from the ordinary to the anomalous, the familiar becomes uncertain. It highlights how that which appears normal on the surface may not be so.

The Opening Sequence.

The title The X-Files, with a large 'X', is stamped on a black and white poorly lit background. This is followed by a coloured video recording with an FBI identifying mark in the corner of the screen, of a group of people observing a UFO tracking across the sky. This cuts to a hand over a diagramatic 'plan' of some sort, and then a close up of a heat sensing electro-magnetic sphere. which cuts to an image of a distorted screaming face with the words "paranormal activity" crossing the screen. This is followed by a poorly lit micro time lapse filming of two beanroots growing downwards.

This blurred image cuts to an FBI Agents i.d. card with a photo of Agent Fox Mulder. The words "government denies knowledge" scroll across the screen. This is followed by Agent Dana Scully's i.d. card. This cuts to images of Mulder and Scully bursting into a room, with Mulder's gun at the ready, and disturbed facial expressions. The lighting is poor, the colours very grey and it is as if shot on a poor quality video surveillance camera. This image whitens out to a blue electric image of a hand print and a ghost-like figure falls through the screen. This cuts to the close-up of a blinking eye in black and white. The final image is that of a cloudy sky with dark horizon and the title" The Truth is Out There".

This opening sequence does not signify any specific reference to science. It conventionally codes images that signify detective genre entertainment. The word paranormal links this to unconventional genre mystery. The use of black and white, poor lighting and the specific images further signify mysteries beyond crime busting conventions. They encode the program with the iconographic conventions of film noir, and to a lesser extent horror, and science fiction.

The repeated use of the same sub-title through this particular series breaks with convention. This novel strategy points to both scientific, and legal judicial preoccupation with the establishment of "truth". However linking this with other strategies raises the broader philosophical questions of who's version of reality is the truth. As the protagonists gain more insight through the series, the nature of the truth changes. This fluid, changing construction of

truth draws reflexive attention to the problematics and complexities of affirming "truths". It presents "truth" as disguising vested interests. This critical narrative focus on truth links to new paradigm concerns.

The story that follows solves the mystery of the disappearance of the town's youth, their "zombie' like states and the labeling of "he/she is one" of teenagers in the small cattle farming town. Within the narrative various scientific and social causal issues are debated. One debate is framed around the credibility of "The Church of the Red Museum" vegetarian cult group located on the edge of the town surrounded by cattle farms. This group is a red herring to tonight's mystery, and in so doing demonstrates the ways different groups in a community are constructed as outsiders. This results in the representation of suspicious labeling, aggressive antagonistic behaviour, and the town's folk attributing everything that is wrong with their community to the outsider cult group. While there is pre-occupation with this group, which is almost rhetorically silent, but visually aestheticised, it is scientific detective work that solves the mystery and closes one of the multiple plot lines.

Scientific framework: modern or new paradigm characteristics?

Reductive forensic medical pathology procedures and toxicology tests carried out by Scully deduce that one of the dead victim's blood contained "trace amounts of an unspecified alkaloid substance, possibly an opiate derivative, as well as large amounts of scopolomin - a drug used for motion sickness. When taken in larger amounts, the Scully didactically tells Mulder, and the audience indirectly, it has hallucinogenic qualities. This information concurs with the representation of horrific nightmarish paranoid, psychedelic reality experienced by the victim before death.

The script also critiques the practice of injecting cattle with genetically engineered growth hormone for enhanced beef production. The contextualizing of genetic engineering within the central 'mystery' highlights the unknown outcomes of this kind of research. The known effects are constructed as positive, and the unknown is presented as the dark side of science - science playing god with nature. It shows the trust in the system that consumers need top have confidence in the nature of the food they buy.

Concern for the dark side of powerful institutions and scientific research projects is extended by the hypothesis that these children are victims of a clandestine experiment injecting them with "alien DNA" to improve their immunity. A local community doctor is implicated. The forest experiences are part of an unorthodox whistle blowing scheme to expose the secret project.

Applying Capra's key scientific characteristic framework, there is emphasis on the utilitarian value of both modern and new paradigm science. Scully's modern paradigm framed

reductive and deductive forensic, pathological and toxicological knowledge enables her to identify anomalous chemical traces in victims bodies. Mobilising Capra's first and fifth modern paradigm scientific characteristics, she focuses on the blood as part of the structure of the body and her findings present a "truth". However these scientific results alone do not solve the mystery.

The usefulness of this scientific methodology is counterbalanced by the doubt raised about the effects of narrow reductive goaled scientific practices such as the use of experimental, genetically engineered growth hormone in meat production. While not directly addressing debating this, these uncertainties are signified by film noir and horror signifying practices.

Holistic Framework: modern or new paradigm principles?

This complex narrative show how cultural points of view effect the reading of reality. By drawing into the story the issue of "The Church of the Red Museum", the preferred reading position on determining who are the bad guys in this mystery shifts. The cult group is shrouded in suspicion for being different, for having different values, beliefs and practices. The preferred readings are set up to align the audience with the suspicions of the good middle class town folk. Then, Mulder shifts perception with a didactic discourse on the nature of their beliefs and the naming of powerful people, such as Abraham Lincoln and Michail Gorbachov, who have held these beliefs.

Another red herring plot concerns rising violence, aggressive behaviour and crime, which is linked to the use of growth hormones. The solution focuses on the power and trust given to a community's physician, who claimed to monitor the town's children's health. The parents believed they were being injected with a multi-vitamin treatment. Growth hormones are suggested, but Mulder suspects alien DNA.

These multidiscursive complexities address the interweaving of cultural, social and scientific factors that influence the perceptions of reality in determining "truth". A shift in understanding in one area influences the reading of another. This identifies Mulder as a holistic scientist, whose work, problem solving and thinking, is represented as synthesizing those holistic principles and engaging with the challenges of the unknown.

It is because he understands the complex ways holism structures and enables the some understanding of reality, or in this case solving the mystery, that he is the hero. However, emphasising the principles of "uncertainty" and change, he is not always successful. As a hero engaging with the anomalous he must also rely on his more nebulous intellectual intuition, along with his scientific and cultural knowledge. It is this more holistic approach that enables Mulder to repeatedly shift point of view through the complex blended generic strategies, and thus direct and re-direct the preferred readings ,and guide the audience's pleasure in the mystery.

The incredible variety of cases involving both mainstream and marginal people that Mulder and Scully are sent to investigate links with Cranny-Francis' theory on the role of cybergs, replicants, and androids in the science fiction film genre. She argues their roles provide opportunity to:

> expose the ideology of their makers - which is usually patriarchal, bourgeois, white supremacist. But their other function is to 'see' the society of the writer and the reader through different eyes, alien eyes; not with the eyes, from the perspective, the subject position, of the dominant discursive formation. (Kuhn, 1990, p. 222-3)

Similarly the identification with Mulder's character encourages the audience to explore the unknown and the issues debated. This challenge is directed through the 'holistic' and fearless detective skills of Mulder. Violent, deviant, satanic, and criminal characters and scenarios serve as reflective critical devices to foreground sanctioned societal practices which trigger violence, deviance, satanic and criminal responses. These characters as rhetorical devices critique the conventional value of scientific and technology and and claimed progress. They highlight the ways institutional power can be abused and corrupted.

Ecological Framework: modern of new paradigm values?

In representing the 'dark' side of human action as underpinned by egocentric, or homocentric values, high value is placed on ecocentric ideology. Science and technology that reductively focuses on claims of progress promoting egocentric or homocentric values, is clearly signalled as frightening, horrific, and coded as inhumane and dystopian. The text highlights the mysterious 'dark' and frightening uncertainties that may the lie beneath the surface of science signalled as playing god with nature, for short term profit and 'progressive' goals.

In terms of ecological values this episode disappointingly raised only homocentric critical concern at the use of genetically engineered growth hormone in cattle production, and the clandestine bio-genetic experimentation with the children. In other episodes, nature is often represented at the micro level of reality such as amoebic, viral, or fungal. This strategy highlights the complexity of ecological reality and how, despite science and technology, our real understanding is in its infancy. This narrative strategy links with contemporary mediation of HIV, AIDs, or the African Eboli outbreaks framed by environmental concern with the clearing to rainforest, global warming, and climatic change. Microbiology links to macro environmental reality. The power and mystery of micro organisms, their ability to adapt or mutate, serves as a rhetorical reframing device to disempower the progressive discourse of science. Such strategies promote a Gaian concept of the reality of life on earth, and highlight the complexity and adaptability of ecological reality. The result is a belittling of human's claims on knowledge of this complexity.

In the psychological domain the narrative spaces given to the subconscious mind and the nature of consciousness, highlights cutting edge questions on the boundaries of quantum physics, and theology concerning the role of consciousness in effecting matter. Indirectly these narratives disempower humankind's cultural sense of mastery over nature, to emphasise the unknown, the lack of certainty and the limitation of existing answers. The text dramatically moves to re-position humans within nature and so promote ecocentric culture.

Conclusions.

The X-Files constructs a series that promotes cultural expression of the ideology underpinning the scientific characteristic, holistic principles and ecological values that coalesce to represent the new paradigm preferred meanings in an entertainment format. As a fictional entertainment text, the 'pleasure' of the text is offered from various strategies such as: complex narrative concern with the mysterious, identification with the two heroes, their discursive arguments, the presentation of a wide range of societal characters from the mainstream to the extreme margins, and the serialisation of narratives linking the weekly episodes.

Interwoven with 'fictional' entertainment the text places the 'factual' discourse high within the hierarchy of discourses. The facts are rhetorically presented by the dialogue of the two protagonists. They speak for both science and discourses beyond science to structure numerous models for problem solving.

Utilising detective plots for narrative structure enables the interrogation of characters at a story level, but also the interrogation of science and society at the ideological level. Reductive science and technology is presented as a valuable deductive tool. This is done by linking the solving of crimes to the deductive methodology of science. However forensic answers are only ever part of the solution. Other psychological, social, political, economic or cultural or inexplicable paranormal determinants are as significant in unweaving cause and effect relationships. This provides opportunity to critique the narrowness of reductive scientific focus, particularly in explaining human behaviour. It highlights the need for holistic approaches as critical to understanding the complex, interconnected nature of reality.

Interwoven multi-plot lines enable the construction of complex situational fictional reality. Strategies that leave some narratives open while others close, foregrounds the reality of living with uncertainty and change. Articulated with this is the employment of rhetorical modes borrowed from the genres of horror, science fiction and film noir that promote shifting audience points of view. The convention of limited points of view links cultural expression of the dominant ideology the modern paradigm.

These strategies structure regime that acknowledges the reading skills of a mature audience. The text calls the audience to active reading positions to deduct what is happening and who is responsible. Open narratives leaves the reader in a critical position to make up their own minds. The experience celebrates living with uncertainty, and promotes the pleasure of seeking knowledge.

The X-File culturally reconstitutes and reframes nature. Nature is not iconographically aestheticised. Nature is not everything living outside of humanity. Nature is represented as complexly interwoven micro and macro reality. Micro organic reality is highlighted to entertainingly present a vision of ecological reality. Nature is presented as being very powerful. In so doing the text critiques progressive claims by science and technology. This disempowers and belittles the sum of Western man's scientific informed knowledge. By implication human claims of 'mastering' and 'dominating' nature are presented as insignificant in light of the presentation of concepts drawn from chaos theory, complexity science, and Gaian theory. This program uses those new paradigm embracing strategies Henderson (1991, p. 66) uses to manage uncertainty is by employing many models, viewpoints, compromise, humility, openness, evolutions, and learning societies.

6. Science on TV:Textual Analysis - Regimes of Fiction.

6.4 Skytrackers. (1994), Executive Producer Patricia Edgar. The Australian Children's Television Foundation.

Formations - Modern or New Paradigm Imaginings?

Skytrackers is a 26 part half hour 'adventure' series made for children by the Australian Children's Television Foundation. It is shown on the Seven Network at 8.30 am, on a Sunday morning. The ACTF is funded by the Commonwealth and all State and Territory Governments. It receives additional funding from the corporate sector. The initiation by the ACFT of the recent international Summit on Children's television in Melbourne (1995), places the organisation as central in the debating of international policy issues such as the representation of cultural diversity, quality and production of children's television programs. An organisational brochure states their broad formational objective as being:

> The goal of the ACFT is to assist in the development of this country's most valuable yet vulnerable resource: its children. In the coming years their attitudes and behaviour will shape the Australian way of life. Quality programs can contribute to a child's development and creativity, and to a child's sense of personal and national identity, by presenting a diversity of ideas and values reflecting the rich multi-cultural heritage of Australia.

This policy addresses commitment to children's rights as audiences, and acknowledges the potential long-term personal and national gains of producing quality programming for children. Generally texts produced by the ACTF, while pedagogic, employ strategies that entertain, inform, and challenge their audiences, address them as whole persons, and promote bottom-up strategies to encourage active audience reading positions.

The agenda underpinning Skytrackers lies in utilising the rhetorical modes of fiction to engage a young audience with contemporary science. In a 1995 organisational press release for the series, executive producer, Patricia Edgar says of the series:

> This series takes the exciting qualities of science and creates story lines that are fantastic, mysterious and thrilling. The characters follow deep space probes, search for aliens, solve mysteries through computer technology, fly into space, live, love and laugh together. We have set out to popularise science for young children through drama and excite them about the opportunities science has to offer. The CSIRO and NASA have been very supportive with this series and have advised us throughout the development of the scripts so that we are dealing with facts not science fiction. Recent Government reports show that students believe science is boring and is for 'nerds'. Therefore they do not seek a career in science. There is also a perception that the science world is a male world. The series seeks to break down these negative views and encourage children to think about jobs in science areas as a positive option for the future.

This shows the formational agenda of Skytrackers is to reframe the conventional image and understanding of science, address the gender imbalance in science, and actively motivate its audience to engage with science and future scientific careers. Formationally a science positions high on the text's hierarchy of discourses. This agenda implies engagement with the challenges of cutting-edge science. The presentation of this to interpellate the audience to science links with the reframing strategy of removing the boring 'nerdsville' masculine image of modern paradigm informed science. The agenda is to "popularise science" through the text.

The series is supported by curriculum packages for parents and teachers to further direct preferred readings. Three packages focus on relevant curricula topics. The idea behind this is to mix a popular medium with a popular fictional rhetorical mode and educational outcomes. The three subject areas are environment, space, and family and self. These are designed for years 5 to 8. These entertainment and educational strategies break down a traditional fragmented approach to institutional services by linking entertainment values with institutional needs, and hopefully larger audiences. This reflects an agenda that goes beyond divisive and reductive institutional focus and practices.

Modes of Production: Modern or New Paradigm Framings?

Skytrackers' modes of production is social realistic fiction. The production is set in a space research and satellite tracking communications centre, called "The Kaputar Tracking Station". Filming was done at the CSIRO's Australian Telescope National Facility, in northern N.S.W. Nearby is the "Wright Foundation", an organisation dedicated to the promotion of science education. Young scientists come from around the world to partake in experiments, under sponsorship of the foundation. The rural community that surrounds these science facilities, plus employees, provide a realistic 'fictional' community on which the narratives are centred. This setting for the fictional stories aims to demystify the workings and apparatus of science and technology for the young audience.

A realistic sense of community is produced through a mix of interior work environments and various domestic settings, and the rural town, surrounding countryside setting for the research centre. Stories are built around the interactions of adults and children characters in intermixing their work and private lives. The use of this rural setting as narrative vehicle maybe promoting the producers childhood formational subjectivities. It may reflect ideological nostalgia for an adult generations concept of the location of Australian childhood. However the text needs to interpellate an audience who is predominantly located in contemporary urban and suburban settings.

The 26 part series contains half hour episodes. These present a closed narrative and an ongoing serialised plot drawing on strategies of soap opera. This places the discourse of science in a

contextual setting. The facts, issues, methodology and technology of science are contextualised within a pro-science community. These strategies aim to represent multidimensional 'real' characters dealing with real world issues.

Modes of Address: Modern or New Paradigm Framing?

The makers of the series describe the key characters and the setting for the story as follows:

> Mike, Nikki, Maggie and their families live in a remarkable place - beneath the massive gleaming white dish of a space tracking station, located in the heart of an Australian wilderness park. The kids are scientist's children, but that doesn't mean that they're all geniuses. Rather, they're ordinary kids facing the ordinary problems of growing up, but under extraordinary circumstances. They attend school a few miles away in a country town, but home is a window on the universe.
>
> Near the tracking station is an old homestead which incorporates a boarding facility for visiting high school students, who have come from all around the world to conduct space-related experiments under the sponsorship of the Wright Foundation, an organisation dedicated to the promotion of science education.
>
> Revolving around two families, a tight-knit community and a wide range of youthful visitors, Skytrackers deals not just with the discovery of the universe, but with the discovery of self, the world and of others. (Skytrackers press release, 1995)

This fictional construction enables the characters to have 'adventures' that place problems or mysteries in a fictional 'real' world setting. With this framework, answers and solutions to episodic narratives will potentially not just be scientific, but social, psychological, cultural, or political. Serialisation of an ongoing open narrative structure, enables the representation of growth, development and knowledge of characters' life skills, both child and adult, across a range of sense-making, not just science. This addresses the concerns of the imagined audience as evolving, not just recipients of information. Characterisation offers multiplicities of points of identification for audiences.

The articulation of the utilitarian value of science across environmental, space and the family and self themes, points to a construction placing high ideological value on a multidisciplinary, multidiscursive knowledge system. This implies inclusion of the ideology of the new paradigm.

The choice of presenting factual science within a fictional mode presents opportunity to promote the utilitarian values of science. Science is situated in a real satellite research centre, and its workings displayed through fictional characters. This allows a narrative mix of personal, scientific and other educational topics. For audiences the text offers the didactic pleasures, and/or the pleasure of character identification. Characters are divided into the majority who are

enamoured with science and its workings and one who is anti-science. This young male protagonist, Mike, whose father is an astronaut, is constructed as being bored by science. This binary argument allows some of the audience to identify with the text without engaging with science at all. This strategy may run counter to its formational agenda.

For those in the audience interested in science, the plots with an adventure or mystery theme promote the processes of science, as well as finding answers. The pleasure is constructed as this discovery process, rather than outcomes being conceived of as affirmations of truth. The agenda is familiarising the audience with multiple perspectives on the processes of science. This breaks with the conventional preoccupation with facts common to Quantum or Beyond 2000, where the outcomes of science are often wrapped in a progressive science discourse. Skytrackers may address science journalist, Stuart Diamonds (1993, p. 46) concern that the failure to reveal the processes of science is what keeps people from understanding technology and promotes them to be suspicious of it.

Further discourse analysis reveals how science is positioned within the hierarchy of discourses. It identifies what kind of science is promoted - modern or new paradigm. Four episodes from the series are analysed. These were chosen for their narratives which superficially suggest they include representation of both ideological positions.

Opening Sequence:

The program opens with an image of space and the words "The Australian Children's Television Foundation Presents". This cuts to a picture of a large white satellite dish, backed by the sound of a rocket. The satellite disk shape changes to the shape of an eye with the iris filled by the image of space. This cuts to an image of the earth from space filling the iris space, underscored by the theme tune. Portraits of the key characters appear, as if through a lens, on either side the frame within a circle . The shutter blinks and a new face appears; first the 14 year old girl and then the 14 year old boy, followed by the 9 year old girl and two adults together within the shape of the eye again. The 'eye' blinks again and opens to blue sky and clouds. This cuts to the title "Skytrackers" written in graphic style indicating computer technology. The lens blinks again and we have the episode title "Dead Ducks". The production credits follow on a background image of black space and white stars.

This opening identifies a theme on space research, built around these key characters. The images of the satellite track disk and the use a lens highlights both technology and textual focus on the characters. But how this technology is utilised and valued is to be revealed in the text. Foregrounding the image of the earth from space and the technology enabling this event identifies its appropriateness to frame contemporary point of view of reality for a young audience.

Episode 7. "Dead Ducks".

Narrative Synopsis.

> The local legend of 'The sundowner', a turn of the century bushranger, sparks Mike's interest in looking for the bushranger's hideout. Dead ducks are discovered in a lake and an autopsy reveal that lead poisoning was the cause of death. Small traces of gold are found in the duck's gullet. Using remote sensing, Mike and Nikki discover the exact location of The Sundowner's hideout, now covered by a lake. They search underwater and locate the submerged cave, but Bruce and his gang arrive to collect the spoils themselves. Much to their disgust no gold is found. However, plenty of antiques bottles are found and Mike and Nikki end up selling the antique bottles to a local dealer. (ACTF. 1995)

Scientific Framework: Modern or New Paradigm Characteristics?

Both the narrative and the rhetoric promote science as valuable problem solving tool. One of the scientists reveals the reason why the ducks died through preforming an autopsy. Lead pellets are found in the gizzard. This is a reductive scientific technique aimed at identifying an anomaly in some function of a part of the duck's anatomy. This identifies the modern paradigm scientific characteristic of part rather than whole. The reason for the death of the ducks is deduced as being lead poisoning. This scientific approach with its reductive emphasis on the malfunctioning part of the duck, points to modern paradigm scientific characteristics. However the rhetoric extends beyond this to a didactic message on the wider implications.

Nikki's scientist mother explains how ducks swallow stones to aid digestion, and are unable to distinguish the different between stones and lead shot at the bottom of a lake. Reductive knowledge is made more useful by understanding the nature of the processes that result in the ingestion of lead shot. The paradigmatic framing to this science shifts to articulate Capra's second new paradigm characteristic of process.

Nikki asks how the lead shot would have got there and her mother replies "duck shooters probably". A human activity is linked with the life processes of a duck, which causes the duck to be poisoned. Science is constructed as the investigative tool to deduct the rationale that builds the network of cause and effect relationships. This strategy articulates Capra's fourth new paradigm characteristic of network as metaphor for knowledge. This emphasises the problem solving effectiveness of new paradigm over modern paradigm science.

Nikki's mother then finds gold in the duck gizzard and the fictional mystery begins. The children then use satellite remote sensing as their next scientific detective tool. Again this scientific approach, while reductive and fragmented in its capacity to analyse a part, or specific detail landscape information, enables the linking of reductive information to more holistic understanding of the processes at work. The children examine the relevant remote sensing information, ion radiant heat, cloud formations; and algae concentrations.

Applying their own intellectual intuition they deduce that the lake has got bigger, and further investigate why algae is so concentrated in one particular area. Their detective work promotes scientific detective work as structuring knowledge as a network pattern. Though understanding the reductive chemical components in fertiliser and hydrology flow patterns the children make the link between the algal bloom, and the gradual leaching of a bushranger's cache of supplies and ammunition. Knowledge outcomes are structured as interlinking networks. Their findings represent valid approximate descriptions rather than truth. This promotes the value of new paradigm science for problem solving in the real world. However does the narrative engage with holistic logic beyond its discourse on science?

Holistic Framework: Modern or New Paradigm Principles?

Exploration why the ducks died illustrates the interconnections between duck shooting and the indirect death of the ducks. Similarly the narrative shows the interconnections between fertilizers usage and algal blooms in waterways. This highlights the ways effects are redistributed. The enlarging of the lake over time presents change as an inevitable part of ecological reality. This narrative draws focus on the need for holism when interpreting ecological models.

Ecological Framework: Modern or New Paradigm Values?

The narrative negatively links human activity to animals, in this case ducks. The catalyst is the finding of the dead ducks. This strategy critiques the consequences of a human-centred activity such as duck shooting. In this case the ducks are not shot, but die from ingesting lead shot from the bullets. Two effects to one human activity or environmental reality are foregrounded. No direct judgement is made. The discourse is opened up for ecocentric questions. This strategy fails to go far enough to promote ecocentric values. Including this story in the ACTF environment curricula package relies heavily on the text being viewed in a classroom context with teachers to debate and extend their ecological meanings. Those viewers watching for entertainment pleasure will be pre-occupied with the egocentric value in the plot, those underpinning the desire to find the gold.

Conclusions.

There is voice given to the ideology of the new paradigm. However, in directing the preferred readings towards new paradigm informed ecological sense-making in both science and beyond, the textual strategies rely too much on it being viewed in a pedagogic context. The support of teachers may be necessary for viewers to read the text's preferred meanings. While the value of science is placed high within the text's hierarchy of discourses, science as knowledge is placed along-side other life coursing strategies and skills within a community context. Non-scientific issues are debated and promoted with science. However, audience research would need to determine the pedagogic effectivity of the strategies employed in this text. The entertaining narrative of

searching for gold rather links the interpellating strategy as the pleasure may overwhelm the other meanings.

Episode 14. "Aliens".

Narrative synopsis.

> Nikki, Mike and Maggie see lights in the sky one night. They wonder if it's a UFO. Giles seems to be acting strangely and Maggie thinks Giles might be an alien. Mike and Nikki discover that Giles is interested in UFO sighting. Mike, Nikki and Maggie hide in the back of Giles' vehicle as he goes out one night to investigate the cause of of the weird lights. The lights appear and everyone is stunned. Whilst not admitting there could be visitors from another planet, Giles does concede that "there are more things in heaven and earth than we could ever dream of". (ACTF. 1995)

This episode highlights the open nature of debate between scientists seeking answers and solutions to questions on the margins of accepted science. At the end of the episode, while they wait in the bush in the dark for a predicted UFO sighting, Maggie asks Giles if he believes in UFOs. He didactically explains to the children:

> Well there are many things we don't understand and can't explain. We're a tiny spec in 400 billion stars and the mathematical chance that one of these suns is life giving are astronomical. But even if it were only point one of 1% then there'd be 400 million suns just like ours. Why should we be the only intelligent life form in the entire universe? But thus far every UFO sighting has been explained so I don't believe in UFOs.

Strange music rises out of the silence. Maggi shouts "wow!" The area fills with light and a rush of air knocks over the camera on a tripod ready to gather photographic evidence. Just as quickly the light source disappears. Supporting the image of the three children and Giles sheltering behind the car, looking up and protecting their eyes from the bright light, music builds up and suduenly drops out. Nikki exclaims: "if that wasn't a UFO". Giles says " there's a perfectly logical explanation". "Yeh, like what?", asks Maggie. Giles continues with the rhetorical lesson for the episode.

> Well the universe is a fantastic mystery, that's why we study it, that's why they write about it in literature. Our knowledge is like a flea on the elephant's back. What we can't explain today, we might understand tomorrow!

As they all stand gazing in wonder up at the night sky, the camera pans in on Maggi's face as she says excitedly "I can't wait".

While this episode is not suitable to apply the scientific, holistic, or ecological framework, it is relevant to note its open discourse on the changing nature of scientific knowledge. Despite science being placed high in the hierarchy of discourses, the emphasis is on unanswered questions. The aliens debate provides a narrative tool to illustrate this. The rhetoric underlines the

principle of uncertainty. In line with this new paradigm framed principle of uncertainty the promotes the shift from truths and certainty as framing the quest for knowledge. Giles's pointed rhetorical reference to the meanings constructed by literature empowers other cultural discourse beyond science. This open ended rhetorical strategy presents a framework for discussion beyond science that links to the new paradigm approaches.

Episode 19. "Secrets".

Narrative Synopsis:

> Wright Foundation student Simon comes to Kaputa to use remote sensing to locate ancient aboriginal sites. Simon uses both intuition and science to help him locate an ancient cave. Mike doesn't believe in intuition. A new road being built threatens Simon's discovery and the kids chain themselves to a bulldozer to protest. Finally the road works are stopped. Mike learns that everyone has intuition, not just Simon. (ACTF 1995)

This narrative presents discussion on the utilitarian value of both rational 'scientific' thinking and 'non-scientific' intuitional thinking in contributing to knowledge and insights.

Scientific Framework: Modern or New Paradigm Characteristics?

Simon is skilled with using satellite tracking information. It provides a scientific tool to help him identify locations for local caves, or evidence of indigenous settlement. This narrative promotes the idea that science is just one tool for understanding reality. He explains to the other children of the need to get out on foot in combination with "Landsat" images and do some "ground truthing". The purpose of this, he says, is to verify the readings out in the terrain on foot.

This foregrounds both the scientist's intellectual and observations skills in combination with scientific technology in solving interconnected complex real world problems. This identifies Capra's first key scientific characteristic component of emphasising the whole rather than the part. Later in the story Simon explains to the other children how he got the idea from satellite work done used to trace the old silk route through Central Asia: "Their trail went from oasis to oasis because what you always need for life is?" Mike replies: "Fast Food". "No Water", says Nikki. Mike argues that he has been up and down this valley fifty times or more and he's never seen a trickle.

By using the Landsat images Simon and Nikki explain to Mike how the computer images can be used to understand ancient land formations. There was a river there thousands of years ago. Nikki shows the ways the technology represented by the images on the computer screen aids understanding the past: "the soil washed down is different to the soil on the banks - its denser so it holds its heat longer. That's why it shows up on the infra-red ban". This scientific approach emphasises landscape as being process oriented, not structural. History is constructed as recording

those processes that interlink to build a network of observable effects constructing reality today. Knowledge is presented as a network. This identifies another of Capra's new paradigm scientific characteristics. This scientific window on history is conceived of as useful approximate descriptions, rather than truth. This presents Capra's final characteristics of new paradigm science. The didactic explanations of Simon present opportunity for teachers to engage in classroom discussion around the utilitarian value of the new paradigm science, in not only understanding present reality, but also history and by implication the future.

The narrative then critiques the limited focus of structural engineering practice with its traditional reductive modern paradigm models. Road builders are presented blasting the countryside. Their only concern is with getting the road through. Only when politicians and the media become involved does the road making stop.

Simon, a Wright Foundation student, is an aboriginal. This characterisation culturally reframes an aboriginal stereotypes. Another agenda lies in Simon's promotion of the importance of intuition or "feely feelings" in the pursuing knowledge and problem solving. These para-sensitive intuitional feelings reinforce a racial stereotype on one hand, but on the other the rhetoric explains everyone as having the capacity to use "feely feelings". In validating these Simon says to Mike: "science can't explain everything." ... "Like love - science can't explain it, you can't see it or measure it, but it exists right!" While this narrative engages its audience with science, this story articulates science as just one tool. The sense-making strategies of traditional aboriginal culture is positioned alongside science.

Conclusions:

This text presents some of the characteristics of the new paradigm science. Its strong agenda to interpellating a young audience to engage with science, places science at the top of its discursive hierarchy. This high discursive position manifests itself in didactic rhetoric to direct the audience towards the preferred meanings. However the didactic rhetoric contained within the various narratives places high value on the open nature of contemporary science discourse.

Narratives contextualise the work of science within a community. Within that community setting there is opportunity to promote the values of discourse beyond science. Science is not the only way of interpreting reality. Science is represented as not having all the answers to the narrative questions. Other points of view than that of science are promoted and validated as in Simon's intuitional "feely feelings" in the "Secrets" episode. Problem solving that closes narratives may be a characters' personal concern, at a communal social concern, or an institutional concern.

The text disguises its strong formational agenda by presenting its science discourse within a variety of other ongoing fictional narrative concerns to engage its young audience - i.e., romantic,

social and cultural issues. These ongoing narratives are interpellating devices hailing both an audience to questions of growing up in contemporary Australia, and with science being of significant importance. Addressing personal, developmental and social issues through the narratives constructs multidimensional characters. This strategy provides pleasure for the young audience and offers multiple character points of view for viewer identification. However this pleasure giving interpellative strategy may be all that audience take from the text.

Analysis reveals that the text fails to engage ecoculturalist perspectives and is dominated by egocentric or homocentric values. The narratives' setting contextualises science in a world where there is potential for the inclusion of the preferred meanings of the new paradigm. The rural setting is underutilised as an opportunity to promote ecocultural values. Instead the countryside is predominantly presented as an aestheticised, romantic and nostalgic setting for the promotion of community to an audience inhabiting a predominantly urbanised and human dominated environment. Narratives included in episodes such as "Dead Ducks", "Secrets", "The Beast", and "The Black Prince" superficially engage with environmental concerns. The animals are narrative devices to construct drama for humans, rather than constructing any ecocultural preferred meaning.

Looking at the ACTF teachers' environment guide, the specific episode such as "Dead Ducks" does provide opportunity for more discussion of the holistic and ecological nature of reality, when viewed in a classroom context. However the majority of audience viewing will be done alone and unsupported. Skytrackers may have successfully reframed preferred readings on the attractability of science as a subject area, or career choice. However, its effectiveness in promoting the ideology of holistic principles and ecological values to structure a cultural product engaging with the challenges of contemporary science, is limited. Its overwhelming didactic message is the utilitarian value of science, and children can do and understand science. Analysis does however the reveal the ways some ideology of the both the paradigms of science are heterogeniously represented. Unfortunately those interpellative strategies which rely on characterisation to draw audience interest to the preferred meanings may also overwhelm the didactic attempts to draw the audience to science and limit the text's achievement of it strong formational agenda.

6.5 Findings and Discussion

These three fictional texts variously engaged with the ideology of the new paradigm. Discussion of the findings derived from the formational agendas, modes of production and modes of address, reveals the ways new paradigm scientific, holistic and ecological meanings are promoted or absent.

All three texts' formations are underpinned by agendas to variously present contemporary science issues to their imagined audiences. This strong agenda is linked to the desire to present this in various entertaining and pleasure-giving ways. Their fictional mode enables them to present diverse points of view concerning the utilitarian value of science through various characterisations and narrative strategies. Their different generic conventions allow them to contextualise science in diverse fictional cultural, social and environmental settings.

Captain Planet derives from a conscious agenda to construct preferred meanings underpinned by strong commitment to the new paradigm scientific, holistic, and ecological ideology in an entertaining manner. A regime of fiction structuring strong children's entertainment values is formationally envisaged as the appropriate communicative tool for this agenda. This agenda highlights a formational desire to interweave a fictional regime with a factual multidiscursive framework. This formation leads to a didactic strategy to direct audience readings towards these preferred meanings. Underscoring this agenda is the desire to interpellate an international audience.

The X-Files formational agenda lies in reviving a previously successful 1960's television genre which mixes science fiction/horror mystery with detective narratives and positioning it in a 1990's fictional setting. This agenda positions both a promotional and critical science discourse side by side. While Captain Planet didactically interweaves a fictional regime with a multidiscursive factual discourse, The The X-Files's formational agenda lies in interweaving a more open adult text employing an entertaining fictional regime to address diverse points of view. The text formational agenda aims to interpellate a North American audience. The text successfully rates with an English speaking international audience.

Skytrackers has a strong pedagogic policy agenda to not only interpellate a young audience to the text, but encourage the same audience to think about science as careers. This strong didactic agenda is disguised by with the text's fictional entertainment strategies. This agenda to primarily 'sell' science often overrides questions of what kind of science is being sold. The textual emphasis is on science methodology, and science technology. The preferred meanings in the text link to the

promotion of science as progressive utilitarian tool. This ideology is reinforced by the narrative closure contained in each episode.

Captain Planet's fictional mode of production is cartoon. This genre traditionally gives pleasure to its young audience. Children have developed skilled modes of reception for reading the complexities of this genre. While considered low status television for adults, it is high status for children. As such it is an appropriate interpellative strategy to engage children in an entertaining way with a pedagogic agenda. This mode of production enables the promotion of the ideology of new paradigm through the freedom the genre offers to address diverse narrative concerns with little effect on production costs.

The X-files' mode of production is serialised fictional realist drama. This realistic mode of production interpellates both a male and a female audience to engage with the representation of personal and professional drama of the two F.B.I. protagonist characters' lives. This mode of production sets up the potential to address questions concerning the nature of the real and the unreal. The hour long time frame gives opportunity to explore complex narrative structures which promote the utilitarian values of both the modern and the new paradigm.

Skytrackers' mode of production is also serialised fictional drama. This production strategy allows the development of multiple characters' points of view to present multiple choices for identification to engage audiences. Setting the drama in a realistic fictional science community identifies potential for narratives contextualise the values and outcomes of science.

Captain Planet's modes of address presents opportunity for the representation of the new paradigm scientific characteristic, holistic principles and ecological values. In an entertaining and didactic manner varied narratives inform the audience about the power of applying new paradigm understandings to our vision of reality. These narratives are located both globally, bio-regionally, culturally and locally. This provides opportunity to foreground the Gaian ecological nature of reality that binds us all across the planet. Telling social, political, cultural, and economic framed narratives also provides potential to the powers of holistic and ecological approaches to diverse discursive problem solving.

Situating narratives in diverse communities across the planet links with the multinational background of the Planeteers. This empowers different points of view from the hegemonic Western scientific point of view. Linking a team of international children as support crew for an architypal male hero, and the ultimate female planetary goddess with a cartoon mode of address, potentially empowers audiences into active reading positions. Setting the text in the future promotes engagement with the text as both entertainment. It also presents opportunity for serious critical discourse of present day realities the young audience sees represented in 'serious' programs such as news and current affairs.

The X-Files modes of address, employing dramatic serialisation of both open and closed mystery solving narratives, potentially interpellates a mature audience to active modes of reception. The mix of multiple closed and open narratives promotes the value of multidisciplinary discourse, which links to promote the organic, holistic and ecological nature of the new paradigm vision of reality. The genre bending use of the iconography of the horror genre provides opportunity for the text to highlight the discursive cultural framing to concepts of the 'real' and the 'unreal'. This representational strategy allows the text to critically engage with the closed positions associated with the pre-occupation of affirming truths that underpins the modern paradigm scientific vision of reality.

The positioning of narratives in different communities across the United States gives opportunity for the text to present the complexities of social formations, both individual, communal and institutional. This promotes discourse on the holistic nature of social reality. Interlinked with this diverse social setting, is diverse environmental settings. These provide opportunity to foreground the diverse ecological nature of reality and the ways this interlinks to affect human reality at both the macro and micro level. These strategies used in The X-Files enables the text to engage with ecological preferred meanings that are underscored by understandings from Gaian theory, chaos and complexity.

Like The X-Files, Skytrackers' mode of address employs dramatic serialisation that intermixes both closed and open narrative strategies. The more closed narratives uncritically display the utilitarian value of science in solving mysteries. The ongoing open narratives concern the development of the protagonist characters at a personal and communal level. Characters are structured on a binary basis as pro-science or anti-science. The central male character against science is constructed as bored by it, but through the series comes to accept some of its usefulness. This allows the young audience to bring their own subjectivities about science to the text, and gain pleasure through character identification.

This representational strategy may be a successful interpellating strategy to entertain the audience. However this strategies allow those also bored by science to engage only with the ongoing plot structuring character development and interactions. Addressing a largely urban audience through a rural community reduces the opportunity for identification with the characters and their various engagement with science. This cultural framing to the text may weaken its potential to achieve its strong policy agenda.

Chapter 7.

7. Summary.

Analysing the paradigmatic framing underpinning to the formational agendas, modes of production and modes of address of six very different texts is fruitful to reveal how meanings are interwoven into cultural products. Tracing the ideology of the paradigmatic underpinnings through the different stages of the process of constructing preferred meanings from producers to readers, reveals the complex and interconnected diffuse nature of effects in the formation of those preferred meanings. The demonstrates how television texts variously mediates the values of different ideology of the two paradigmatic frameworks.

Formational Agendas and Imaginings: Paradigmatic Impact.

These six texts were subjectively chosen for analysis because, from the surface they appeared to variously engage with the ideology of the new paradigm. This strategy underscored a thesis question that there maybe a link between the modes of address and the various ideology of the two paradigms of science. However it appears that the formational agendas' underpinnings impacts the most upon the paradigmatic framing to direct a text's preferred meanings. Each of the six programs different modes of production and modes of address promoted to some degree the ideology of the new paradigm to verify this.

Analysis reveals the ways formational agendas and modes of production powerfully interlink with the ideology of their industrial, institutional and financial underpinnings to direct the preferred meanings. Questions concerning the ideology of the agendas that lie beneath a text's formation hold the fundamental key to the determination of the preferred meanings. The question to be asked is, does a text primarily serve the needs of its supportive industry or institution, or is it positioned to address audiences needs? If a text's prime purpose is to tell or rather sell science and technology, the result may be a didactic closed discourse on science.

If that institutional sourcing is underpinned by the ideology and practice of the modern paradigm then those meanings spill over to dominate the text's meanings. Thus the text reinforces the dominant hegemonic ideology of the institutions or the industry from which it is sourced. The top-down nature of this process can ultimately disempower the active reading potential of audiences. With the dominance of modern paradigm framing to hegemonic beliefs and practices in Western society, it is hardly surprising that these are the values that interweave to dominate the meanings of texts selling, or telling their stories.

Evidence of the problem of serving industry or institutional needs over audience is found in Quantum, Beyond 2000, and Skytrackers. Quantum and Skytrackers' production agendas link to

several public policy initiatives to sell Australian science and technology as an imagined contributory factor to improve Australian's international economic standing. This formation weighs heavily on the meanings constructed in these texts. This result also links to the meanings in Beyond 2000. While Quantum and Skytrackers tell (sell) science stories, Beyond 2000 predominantly sells technology as the development outcome of scientific research and development. The deterministic power of this industrial agenda links to the deterministic imaginings of passive modes of reception as outcome in the form of the consumption of a techno-deterministic future.

However in a similar way if there is an institutional agenda to promote the ideology of the new paradigm those preferred meanings also dominate the text. The other three texts, Totally Wild, Captain Planet, and The X-Files were product outcomes of such agendas. "The New Genesis" episode of Quantum can also be included with these. Each of these texts included preferred new paradigm meanings. The X-Files, Captain Planet, Totally Wild, and Quantum "The New Genesis" derive from an agenda to tell new paradigm stories to audiences, and to consciously promote active engagement with these meanings in audiences.

This is one part of these texts' formational interpellative strategy. A second key formational factor lies in the underlying desire to interpellate the audience through entertaining them, informing them, giving both pleasure and empowering challenges. The preferred reading outcome is imagined as a complex task, that is promoted through offering more open strategies, and multi-discursive framing for more active audience reading positions. These strategies variously contribute to the text as entertainment. These formational imaginings interlink with a texts various mode of production chosen to mobilise the preferred textual meanings.

Analysis of these three text's formational agendas reveals both the desire to include new paradigm ideology sourced from science and its institutions, and the desire to provide a service for the imagined audience. This affirms the the importance of the fundamental question producers have to ask themselves - are they supporting their industrial or institutional needs, or are they fundamentally addressing their audience?

Modes of Production: Paradigmatic Framings.

The modes of production employed by these texts divide into those that structure as regimes of facts, and those that structure as regimes of fiction. Quantum, Beyond 2000 and Totally Wild construct regimes of facts. Drawing on the production conventions of news these texts employ high modality, semi-documentary style modes of production. Reporters dominate the rhetorical narratives. Studio reports are supported by on location interviews with experts, and on location footage. Both direct address and voice over mode is used by reporters to narrate their stories. These seriously constructed informative factual strategies are augmented by computer derived maps, graphs and models.

Like news, the time frame allocated to these texts is conventionally divided up into segmented categorical frameworks. Conventionally Quantum includes four stories in its half hour, Beyond 2000 eight to ten items, and Totally Wild seven items. This categorising and fragmented framing links to closed modern paradigm discursive practice. Reporters and hosts are constructed as trustworthy "personalities" to link in the fragmented segments and bind the project.

Quantum is shot in a studio setting and on location, with the experts conventionally sourced from the university academy. This institutional link is reflected in the framing of knowledge as is the disciplinary convention of the university. With with the ideology of the modern paradigm hegemony dominating these institutions, through this sourcing of narrative, the hegemonic ideology is similarly transferred to the text. The ideology is reinforced by the didactic, closed, and contained narrative strategies, and the hierarchical authoring of voices in the presentation of their facts. The strategies employed interweave to affirm the dominant hierarchical positioning of science discourses as ultimate arbitrators of reality. Only when stories are sourced from new paradigm scientific discourse, are those ideological preferred meanings included.

"The New Genesis" episode of Quantum has more open characteristics and more new paradigm meanings. While this episode employed the same conventional modes of production as other episodes, questions were more often left unanswered than is the norm. This implies that its rhetorical mode and its narrative sourcing, rather than its mode of production impacted upon the contained ideological preferred meanings.

Beyond 2000 uses similar modes of production as Quantum to authorise its progressive technology discourse. The text employs strategies to signify more informality than Quantum and discursively position technology as a materialistic issue of 'life style' choice borrowing on the signifying practices of advertising. These strategies interweave with a formational agenda to promote the ideology of a progressive capitalistic and technological future and the capitalistic text as product.

Totally Wild's mode of production links with the more informal style of Beyond 2000. Linking with its strong agenda to actively engage its young audience with environmental meanings both represented in the text, and in the audience's own contextual environment, this mode of production is dominated by preferred new paradigm meanings. Employing young reporters and "rangers" whose style is both informative, informal and practical, places less institutionalised and hierarchical weight on author voices and preferred points of view. Children are given a voice as well as adults, and experts may be equally sourced from universities, state or local government, or interested volunteers. Graphics, on location footage, naive drawings are all used to support the ideology underpinning the agendas of the text. These focus audience attention more on engaging with the preferred meanings, and less on the institutional underpinnings of the text.

The dominance of on location setting, both rural and urban positions the text as discursively engaging with the ecological nature of reality. Nature is not constructed as merely a romantic aesthetic setting to sell a story. The countryside is not the only setting where nature is represented as being located. Nature is found in the human dominated urban concrete jungle. This promotes holistic ecological meanings that reposition mankind within nature, not apart from it, struggling to master it. This links with the text's strong agenda to deliver messages containing significant representation of the ecological values of the new paradigm.

Captain Planet's cartoon mode of production serves the ambitious new paradigm informed agenda setting formations of the text. This mode of production enables the text to engage with multidiscursive issues and locations with little impact on institutionalised costs of production. Its cartoon mode of production also enables the text to engage with a futures discourse without huge cost implications.

This outcome of contained cost of production, linked to diverse narratives, reframes holistically several dominant modern paradigm binary narrative discursive practices such as a fact vs fiction, nature vs man, the public and the private domain, first world positioning and 'others', and modern vs. indigenous people's knowledge. Like Totally Wild this reframing of binary arguments promotes holistic and ecological meanings.

The X-Files uses serialises realistic fictional drama as its mode of production. Narrative focus on two fictional characters as both private individuals and pubic officials, provides opportunity to remove the modernist binary public vs private discursive divide in its construction of reality. This fictional world provides opportunity to place science in a 'real' world context, not just the institutional laboratory. A complex real world setting also provides opportunity to narratively highlight the holistic, interconnected, complex and chaotic multiplicity of factors that construct new paradigm vision of the nature of social and ecological reality.

This is supported by the mode of production allowing various locational setting for stories. These different locational and community settings also enable the text to engage with the links between environment, history and culture in contributing to localised visions of the real and the unreal. Constructing the two protagonist characters as 'feral' F.B.I. agents, whose vision of reality is discursively formed by science, enables critical narrative engagement with scientific discourse. Scully's role as pathologist enables rhetorical arguments about both the macro and micro nature of reality.

Skytracker's mode of production as serialised fictional drama is set in a rurally located science research community. This strategy enables a the construction of a holistic approach to childhood and an opportunity to situate science in the real world. This strategy also potentially

contributed to a re-imagining of the binary public vs. private divide of modernist discursive practices.

Different modes of production employed by these six texts highlight the structural links between representational strategies and the different visions of reality underpinning the two different paradigms of science. Some modes of production promote the inorganic, fragmented and mechanistic vision of reality of the modern paradigm, while others promote the more holistic, organic and ecological vision of the new paradigm reality

Modes of Address.

The modes of address of a text give voice to the visions and agendas underpinning the ideology of a text's formation and mode of production. The various modes of address utilised in these six texts highlight the ideological values underpinning the relationship between the producers' agenda, their preferred meanings, and their "imaginings" of audience. This analysis shows that if producers have formational agendas to direct new paradigm meanings, the modes of production and modes of address will interweave to rhetorically promote this.

Some modes of address and pedagogic strategies link to encourage empowered active modes of reception in the reader , while other top-down approaches promote passive modes of reception, regardless of the preferred paradigmatic meanings. Along with rising democratic concerns in society, empowered active audience reading positions are considered more progressive than disempowering top-down strategies. This conclusion is noted in the ways the formational agendas, modes of production, and modes of address variously interlink to position the audience in the six texts examined.

Quantum's dominant closed, and serious mode of address speaks for scientists , the Academy, and their institutional point of view. This ultimately disempowers its audience. Its rhetorical mode interpellates those already engaged with the dominant discursive science framework and institutional practices. This mode of address is used to conventionally deliver "good" news messages about scientific research outcomes located in universities, or the military. 'Trustworthy' reporters control the closed narratives, largely speak for, and interpret, science for the audience. It is concerned with representational strategies that structure answers not questions. Re-iterating the regressiveness of this practice, science journalist, Stuart Diamond (1993, p. 4) says: "The failure to reveal the processes of science is what keeps people from understanding technology, and promotes them to be suspicious of it."

In contrast in "The New Genesis", Kelly's central role to speaks for audiences and concerned scientists and ethicists. Her mode of address is reframed to ask questions, not give answers. This strategy opens up the text. It presents multiple points of view, and encourages the audience to

actively engage with the debate. The ethical framing to the text as a rhetorical mode opens up debate to new paradigm questions which foreground the potentially disastrous uncertainties of genetic engineering.

Beyond 2000's more informal mode of address tries to hide its institutional underpinning and promote technology as a lifestyle issue. Breaking with the serious mode of Quantum, it employs as interpellative strategy the promotion of 'whizz bang' advertorial consumer choices, and takes for granted the progressive belief in a technological future. When items contain new paradigm meanings these too are addressed as fragmentary life-style issues. In this environment, pedagogic new paradigm preferred meanings momentarily bubble to the surface to quickly be submerged by closed advertorial messages containing the materialistic values of dominant capitalistic ideology. There is little self-reflexivity about this ideological conflict from reporters, who tend to dismiss such matters with light hearted cliches.

Totally Wild's informal information as informative entertainment speaks directly to the needs of its young audience, as well as meeting the text's strong formational agenda. Multiplicities of points of view are offered in the mode of address. These voices are not linked to position knowledge hierarchically. Didactic messages inform about processes rather than outcomes. The young audience is empowered to get involved with the world outside their television viewing room, by the voices of other Australian children who have already done so. Nature is represented as all around them - in their backyard, their school yard, the drains on the road side, and the air they breathe. Children are shown actively revitalising deteriorated landscapes. This strategy empowers children, gives knowledge and encourages all those who seek to engage with nature and understand the ecological new paradigm framing of micro or macro reality around them. With these representational strategies, the text consciously promotes ecocentric values.

Captain Planet's multidiscursive framing that underpins its narrative rhetoric enables the mobilisation of new paradigm scientific characteristics, holistic principles and ecological values. Placing these messages in this entertaining mode of address interpellates the young audience to partake in the pleasures associated with this cultural form. Narratives drawing on the conventions of super heroes, empower the audience with entertainment, while directing them to the place high value on the ideology contained in the preferred meanings. Adding the goddess Gaia as ultimate supper hero to the narrative allows gender reframing to the dominant male values of the genre. The iconographic presentation of bad guys or "polluting perpetrators" highlights the failures of those who fail to engage with new paradigm models. Metaphorically overthrowing these architypal 'bad' characters legitimates the revolutionary rhetoric of the heroes.

Including multinational cultural representatives in the Planeteers and other characters provides multiplicities of points of view. This promotes the ideological importance of preserving cultural diversity in the global village. Similarly the representation of diverse ecological

environments highlight the importance of these for a planetary society. These narrative and representational strategies cohere to mythically present the organic, holistic and ecological new paradigm vision of reality. The "Planetary Alert" section of the text didactically calls the audience to actively engage with environmental reality in achievable ways in their own domestic, or neighbourhood environment.

Similarly, The X-Files' mode of address interpellates its audience to actively engage with the entertaining challenges concerning the nature of the 'real' and the 'unreal' represented narratively. Intermixing the conventions of the detective solving mystery, with other characteristics drawn from film noir and horror, displays science as both benevolent and dangerous. Within the fictional setting, equal importance is given to scientific facts, and other discursive arguments are used to mobilise shifting point of view around the nature of the mystery, and by implication the nature of reality. Reflecting contemporary post-Khunian approaches to science these shifting points of view also highlight the cultural specificities underpinning visions of reality.

The use of open narrative strategies highlights uncertainty as a fundamental framing new paradigm component. Mysteries are only partially solved. Exposing the limited role of forensic science in holistic problem solving, critiques the limitations of scientific methodology. Forensic science also presents opportunity to foreground both the holistic and ecological nature of reality at the micro, as well as the macro level. The challenges set up for audience by these complex modes of address underpinned by new paradigm meanings, empowers mature audiences to engage with active and critical reading practices. The dominant ideology constructed in this text, link commonality with those represented through different modes of address in Captain Planet.

Like The X-Files, Skytrackers mixes open and closed narrative structures in a dramatic serialised mode of address. Its mode of address acts as a vehicle to display and demystify science, and its complex technology through a the workings of a satellite research centre. Those narratives promoting the utilitarian value of science are more closed, while those concerning the personal development of the central characters is open. This representational strategy interpellates the audience to engage with the discourse on human nature, rather than science. The text does not critique science, and rarely highlights its limitations.

Characters unsympathetic to science are represented as bored by it. This binary argument between disinterest and commitment, and the open nature of the narratives structured around personal character development give wider room for audience identification with enjoyment of the text, but not necessarily science. This central focus on character development brings to the text a domination of human centred values and so fails to engage with the ecological nature of reality that binds and repositions humankind within nature.

Chapter 8.

Conclusion.

The summary of findings illustrate the ways the different ideology of the two paradigms of science is interwoven into the preferred meanings of the different texts. Analysis also demonstrates their important role as popular information-diffusing agency for contemporary society. Their various discourses contain the processes that articulate the hegemonic process that Lull (1995) describes as the complex dialectic between institutionally sponsored, technologically mediated ideas and culturally situated, intentional social action.

All text included some representation of the ideology underpinning the holistic organic and ecological nature of new paradigm understandings. This outcome brings this thesis to the conclusion that the link cannot be made between some modes of address and resistence to new paradigm preferred meanings. The greatest impact lies in the ideology underpinning the formational agendas of a text. The ideology of the economic, political, and institutional underpinnings to a text's formational agendas become woven into the text. The values are variously woven into the preferred meanings through their different modes of production and modes of address.

These texts show that if producers have formational agendas to direct new paradigm meanings, the modes of production and modes of address used To conventionally articulate the ideology of the modern paradigm will not prohibit this. Representational strategies utilising closed and didactic narratives do allow stories containing the ideology of the new paradigm to be didactically told. However texts employing more open narrative structures, multiplicities of points of view, and the posing of rhetorical questions rather than the promotion of science's answers, appear to more fully allow the representation of characteristics, principles and values that begin to communicate the preferred meanings of the more complex new paradigm understanding of the nature of reality.

Analysis reveals that there is more evidence of the values of the new paradigm in texts including regimes of fiction that those with regimes of facts. Open discourse, and multiple perspectives appears to be important strategies to begin to communicate the uncertainty, chaos and inevitability of change framing the understanding of the organic nature of reality. Examples of more open narratives, multiplicities of points of view and interrogation of science were found in both fictional and factual texts. These representational strategies link with Henderson's explanation of the way uncertainty is managed in new paradigm economic and social vision by employing many models, viewpoints, compromise, humility, openness, evolutions, and learning societies. Texts such as The X-files and Captain Planet appear to employ similar models to construct more new paradigm preferred meanings.

These various modes of address also link to direct in the reader more active and empowered modes of reception. The most powerful representation of new paradigm holistic and ecological meanings are found in texts where there is a strong formational agenda to present these preferred meanings, and where didactic and entertaining strategies are used to persuasively direct the audience to these meanings. Texts like Totally Wild, Captain Planet, and The X-Files present as variously entertaining propaganda to interpellate the audience not just to the meanings within the text, but beyond the text to the real world. These three texts also engaged the most with the ecological values of the new paradigm. As successful commercial texts that are dependent on finding an audience to bring in advertisers investment, their significant engagment with new paradigm ideology points to growing popular consensus about the new paradigm vision of reality. Their didactic mode can be seen as examples of the extreme cultural revolutionary rhetoric necessary to overthrow bad old theory.

These findings highlight the need for careful thought to be given to support for science media by government underscored by the belief that such agendas culturally mobilise the concept of a 'clever country'. The meanings in texts such as Quantum, Beyond 2000, and Skytrackers are overwhelmed by the dominant ideology of their powerful formational institutional support. These institutions appear to resist change. This is reflected in dominant the values included in the 'factual' texts. These texts include the greatest representation of the dominant ideology of the modern paradigm. These texts reflect the greatest formational pre-occupation with supporting institutional needs, and not those of audience.

With growing acceptance of the revolutionary organic, holistic and ecological framework underpinning the new paradigm vision of reality, it is time producers urgently looked to develop texts that inform and engage audiences with the challenges of these radically different models. The popular support for Totally Wild, Captain Planet and The X-Files suggests there is more willingness to embrace change within the ideology included in popular cultural products, than the academy and its various institutions.

Totally Wild, The X-Files and Captain Planet demonstrate that some producers conceive that both adult and child audiences are receptive to various entertaining modes of production and modes of addressing alternative popular ecocultural values. With humankinds' lifestyle choices having an enormous impact on environmental planetary reality, it is time that the organic, holistic and ecological nature of the reality that frames new paradigm meanings be actively promoted in the meanings included in cultural products.

This thesis has focused on analysing the ways the preferred ideological meanings of the modern paradigm and the new paradigm of science are interwoven into television texts. Unfortunately this thesis has only been able to engage with the preferred meanings as they link with a text's imaginary audience. Further research is needed to investigate the effectivity of these

various rhetorical modes in communicating these preferred meanings to audience. The popularity of The X-Files with an adult audience, and Captain Planet with an children's audience suggests that conventional texts such as Quantum and Beyond 2000 will increasingly lose audience unless they can interpellate new audiences to share in the challenges of new paradigm models. Unless these publically and industrially funded science television texts can embrace change they will not only lose audience support, but surely also financial support.

Chapter 9.

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